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REPORT OF THE  
BOARD OF RAPID  
TRANSIT RAILROAD  
COMMISSIONERS OF  
THE CITY OF NEW  
YORK 1900-1901

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CEREMONY OF BEGINNING CONSTRUCTION IN FRONT OF CITY HALL, MARCH 24, 1900.

# REPORT

OF THE

## Board of Rapid Transit Railroad Commissioners

FOR AND IN THE

CITY OF NEW YORK

UP TO

December 31st, 1901

155184

Accompanied by Reports

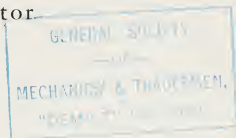
OF THE

Chief Engineer

AND OF THE

Auditor

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REPORT  
OF THE  
COMMISSIONERS,  
WITH APPENDICES.





OFFICE OF THE  
BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS.

*No. 320 Broadway, New York.*

*January 1, 1902.*

TO THE MAYOR OF THE CITY OF NEW YORK,

155184

*Sir:*—The Rapid Transit Act does not require the Board of Rapid Transit Railroad Commissioners to make any periodical reports. Nevertheless it seems fitting, and in accordance with the wise custom governing similar bodies, that detailed and authentic accounts should be given to the public from time to time, setting forth the progress made in the novel and important work entrusted to the Board.

Until the year 1900, nothing had been accomplished beyond the preparation of plans and their presentation to those who were empowered to accept or reject them. This process involved much responsibility for the Board, and much minute and long continued labor for its engineers and counsel,—but there were no tangible and physical results calling for periodical reports. It was not until the 21st of February, 1900, that the first contract made by this Board,—the contract for the great railway in Manhattan and The Bronx,—was executed; and with the actual commencement of work under that contract the need first arose for such a report as that now presented.

But although much was accomplished during the year 1900, this Board could not well take up the question of making a complete official and public report until some time after the close of the year. It was then too late to compile the requisite information and present it to the public until the latter part of the year 1901; and it was concluded, therefore, to submit it at the beginning of 1902, including in it the entire year 1901.

The present report therefore covers a period extending from March 24, 1900, when the ceremonial beginning of work was made, down to December 31, 1901,—a period of a little more than one year and nine months. In reality, the period under review is much

less, for no large force of men was actually set at work until about the month of June, 1900. It is the intention of the Board to publish hereafter a similar report of progress at the close of each year.

On this first occasion, however, the report of the Board should not be confined merely to a statement of the physical work of digging and building. The meaning and purpose of what is being done can hardly be appreciated without an adequate historical account of the preliminary work of this Board from 1894 to 1900.

It is not the purpose of the Board to attempt any account of the earlier efforts made in this City to secure a complete and effective system of rapid transit; but it is proper to say that the work and discussion of previous years had done much to promote a clear understanding of the physical, financial and legal difficulties involved, and thus contributed not a little to facilitating the task of the present Board. The admirable address delivered before the Chamber of Commerce on October 3, 1901, by Mr. Abram S. Hewitt,—to whose foresight, knowledge and persistence so large a share of credit is justly due,—gives a short but comprehensive account of the steps which ultimately led to the passage of the law under which this Board is now proceeding. By the courtesy of Mr. Hewitt and the Chamber of Commerce, the Board is permitted to append his address as a part of this report.

The Act of 1894, to which the present Board owes its existence, was first drafted—as Mr. Hewitt relates—by a Committee of the Chamber of Commerce assisted by the late Henry R. Beckman as Counsel. The draft was changed in material respects by the Legislature, but the main features of the original design were left unaltered. It was that act which made possible municipal ownership of the rapid transit system, and thus made it possible to use the City's credit. These two points were in truth the very key notes of the scheme. "The great object aimed at," says Mr. Hewitt, "was to secure the early completion of the work, its continued ownership by the City, and its reversion at the end of fifty years to the City, free and clear of all encumbrances of every kind and nature whatever."

But although this purpose and object was a novel feature in the legislation of the State of New York, yet the statute in form was

a mere amendment of the earlier Act of 1891; and as it contemplated that the Board which it created should, in certain events, adopt and carry forward the work initiated by its predecessors in office, a complete understanding of the situation existing in 1891 demands some reference here to the provisions of the Act of 1891 and the valuable work accomplished under it.

## THE ACT OF 1891.

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Briefly stated, the Act of 1891, after providing for the continuance in office of Messrs. William Steinway, John H. Starin, Samuel Spencer, John H. Inman and Eugene L. Bushe, (who had theretofore been appointed as Commissioners under the Act of 1875), required that if, after investigation, such Commissioners should deem that the construction of a rapid transit railroad was necessary, they should proceed *first* to adopt the routes and general plan of construction for such railroad; *second* to obtain the consent to the construction and operation of such railroad by the local authorities and the property-holders affected, or, if the consent of the property-holders should be withheld, then the substituted consent of the General Term of the Supreme Court; *third* to adopt detailed plans for the construction and operation of such railroad; and, *finally*, to sell the right to construct and operate such railroad to a corporation to be formed under the terms of such act, for such a period of time as they should deem advisable and upon such terms as they should be able to exact. And by the thirty-second section of the same statute, a very large power was also conferred upon the Commissioners to grant additional franchises to existing railroad corporations.

Immediately upon the passage of this act the Board as constituted by it, entered upon a careful examination of the entire question with the assistance of Messrs. William E. Worthen and Wm. Barclay Parsons, whom it had appointed its engineers. After holding a number of hearings, it reached the unanimous conclusion not only that additional transit facilities were essential, but also that such facilities could be obtained in a manner adequate to the needs of the City, only by the construction of underground railroads. Having reached that conclusion, it proceeded to adopt a route and general plan for the construction of a railroad

running underground through the built up portions of the City, and emerging from the surface only in its northerly portions where the contour of the surface made it necessary. A very full description of the proposed road, accompanied by detailed drawings and reports from Messrs. William E. Worthen, Wm. Barclay Parsons, Octave Chanute, Joseph M. Wilson, Theodore Cooper and John Bogart, regarding the engineering features of the work, was transmitted to the Common Council under date of October 20, 1891, and published in one large volume.

The consent of the local authorities to the construction of the railroad upon the route and according to the general plans thus indicated, was readily obtained, as was also the consent of the General Term of the Supreme Court. (*Matter of Rapid Transit R. R. Comm.*, 65 Hun, 63.)

The Board then proceeded to adopt detailed plans and specifications for the construction of the road, and offered the franchise for sale, to the highest bidder, on December 29, 1892. No responsible bidder, however, was found willing to undertake the enterprise, and the entire work of the Commission thus seemed to be rendered fruitless.

But although the investigations and plans of the Commission of 1891, proved barren of immediate results, they were well worth the labor and expense which they entailed. For not only did the services of that Commission result in the accumulation of a great mass of information which has since proved of the utmost value, but they also did much towards overcoming doubts as to the practicability of constructing an underground railroad adequate to the objects in view, and at an expense which might be calculated with a reasonable degree of certainty.

After the failure to sell the franchise and before the enactment of the Statute of 1894, there ensued a long negotiation between the Commission of 1891 and the Manhattan Railway Company, with reference to an application which had been made somewhat earlier by that Company for leave to build elevated railways upon a number of additional streets. These negotiations were dropped in the month of August, 1893, because of the unwillingness of the Company to make such compensation to the City for the desired facilities as was deemed reasonable by the Commission.



## THE ACT OF 1894.

The Act of 1894 (Laws 1894, Chap. 752) was signed by Governor Flower on May 22, 1894. It substituted a new Rapid Transit Board for that existing under the Act of 1891, and provided that such Board should be composed of the Mayor, the Comptroller and the President of the Chamber of Commerce, as *ex-officio* members, and of Messrs. William Steinway, Seth Low, John Claflin, Alexander E. Orr and John H. Starin. It left unmodified the provisions of the Act of 1891, authorizing the Board to grant additional franchises to existing railroads. It provided that the Board should either adopt the plans for the rapid transit railroad prepared by the preceding Board; or should adopt new plans, and obtain the consents of the local authorities and of the property-holders or the substituted consent of the Court. And it required that, after either re-adopting such old plans or framing new ones and obtaining the requisite consents, the Board at the next general election should submit to the qualified electors of the City "the question whether such railway or railways shall be constructed by the city and at the public expense." The act further declared, in substance, that if such question were determined in the negative at the election, the Board should proceed to sell the franchise to construct and operate such railroad to some private corporation, in the manner prescribed by the Act of 1891.

The alternative provisions, depending upon the contingency that the vote should declare in favor of the municipal construction of the railroad, embraced the vital portions of the law. These were, briefly stated, to the effect that if such question were determined in the affirmative at the election, the rapid transit railroad should be constructed at the public expense, and should be and remain the absolute property of the City, and that the Rapid Transit Board should either provide for the construction of the railroad according to the routes, plans and specifications adopted prior to the election, or should "change and modify the said routes, plans and specifications" or adopt other and new routes, plans and specifications, as they might deem desirable. The act further prescribed that, after establishing the routes and plans for the rail-

road, and obtaining the necessary consents, the Board should, after advertising for proposals, enter into a contract with some person, firm or corporation for the construction of the railroad for the City, and at its expense. The contract was also to require the contractor to operate the railroad, as the lessee of the City, for a term of not less than thirty-five nor more than fifty years, to be specified in the contract, at an annual rent sufficient in amount to pay the interest upon the bonds to be issued by the City to raise the money necessary to construct the railroad and one per cent. in addition thereto. The contractor was to supply the equipment at his own expense. As security for the due performance of the entire contract, the contractor was to furnish a bond to the City in an amount to be determined by the Board; the City was to have a lien upon the equipment furnished by the contractor; and the contractor was also to deposit the sum of One million dollars with the City Comptroller, which was, however, to be returned when the railroad was constructed and equipped. All details as to the construction and operation of the railroad were left to the discretion of the Rapid Transit Board, with the injunction that such matters should be provided for by the contract; and the further duty was imposed upon the Board of supervising the construction and operation of the road.

Other portions of the statute exempted from taxation the equipment of the railroad to be furnished by the contractor, and authorized the City to issue its bonds to raise the requisite funds for the enterprise; with the proviso that the total issue should not exceed the sum of Fifty million dollars.

The statute preserved to the Board the very important power to grant additional franchises to companies actually operating railroads within the City.

The new Rapid Transit Board held its first meeting June 8, 1894, and organized by the selection of Mr. Alexander E. Orr as President. At the same meeting Mr. Orr, who had been elected as President of the Chamber of Commerce, and had thus become an *ex-officio* member of the Board as well as being named by the statute an individual member thereof, resigned the individual appointment conferred upon him by the legislature, and Mr. John H. Inman was elected to fill the vacancy thus created. Subse-

quently, Mr. Starin was elected Vice-President; Messrs. Henry R. Beekman and Albert B. Boardman were appointed Counsel; and Mr. Wm. Barelay Parsons was appointed Chief Engineer.

Upon a careful consideration of the situation, the Board concluded, *first*, that an effective solution of the transit problem could only be reached by the construction of underground railroads, and, *second*, that the routes and plans adopted by the preceding Board were not altogether satisfactory if the railroad was to be constructed by the City within the limit of cost prescribed by the statute. The Board, however, found itself confronted with the difficulty that, under the statute, it was powerless to submit the question of municipal construction to a popular vote until after it should either have re-adopted the routes and plans of the preceding Board, or should have framed new routes and plans and secured the requisite consents. If the latter alternative should be adopted, an amount of time would be required which would make it impossible to submit the question of municipal construction to popular vote at the general election to be held in November, 1894.

The Board was, however, advised by its counsel, that if, for the mere purpose of securing a prompt expression of the popular will, it should provisionally re-adopt the routes and plans of its predecessors, it would be at liberty, in case such vote should commit the City to the theory of municipal construction, to alter the plans after the election, or to adopt entirely new routes and plans. Indeed the statute so provided, the very contingency having been foreseen when the act was drawn. The Board accordingly proceeded, on July 17, 1894, to re-adopt the routes and plans of the preceding Board; but before the November election, an address was issued by the Board, in which the entire situation was fully explained, and the intention was announced of considering the question of routes and plans *de novo*, in case of an affirmative decision of the voters upon the question submitted to them.

In the meantime, and pending the popular decision which was to define the powers and duties of the Board, Mr. Parsons went abroad at its request to study the systems of rapid transit adopted by certain cities in Great Britain and upon the Continent. The results of his observation were published somewhat later in a volume entitled "Report on Rapid Transit in Foreign Cities."

The result of the election of November 6, 1894, showed an overwhelming majority in favor of the plan of municipal construction. The total vote was 184,035; affirmative, 132,647; negative, 42,916; defective ballots, not counted, 399.

PRELIMINARY STUDIES FOR THE MUNICIPAL RAILROAD.

On January 1, 1895, the late William L. Strong, who had been elected Mayor at the preceding election, became an *ex-officio* member of the Board, superseding Thomas F. Gilroy. Mr. Fitch was continued in office as Comptroller. At the same time the Board, to its great regret, was deprived of the services of one of its counsel, Henry R. Beekman, whose election as a Judge of the Superior Court (and hence as a Justice of the Supreme Court under the provisions of the Constitution of 1895), necessitated his resignation, and transferred him to a new field of usefulness, which he occupied until the recent close of his honorable and public-spirited career. Since January 1, 1895, the firms of Parsons, Shepard & Ogden, and Traey, Boardman & Platt (now Boardman, Platt & Soley) have been counsel to the Board.

During the latter months of 1894, the duty of definitely deciding upon the route and plans of the railroad received careful attention from the Board and its Chief Engineer. The advisability of adopting Elm Street as a portion of the route was at this time discussed, but the general opinion of the Board was to the effect that the commercial advantages of using Broadway would more than offset the difficulties and expense of constructing a railroad beneath its surface, that, sooner or later a Broadway route was inevitable, that the cost of construction on that route would then be less than at any later time, and that, upon the whole, therefore the route adopted by the former Board was the most advisable one for the railroad, provided a branch could be constructed in extension of the east side route to the north, as a substitute for the Madison Avenue line recommended by the earlier Commission which had been rendered unavailable by Laws of 1892, Chap. 369. It was thought that it would be possible to extend the Fourth Avenue route north from Fortieth Street under the Grand Central Station, and under Fourth Avenue to

Ninety-seventh Street, where it would emerge and gradually ascend upon an elevated structure to be erected on either side of the Harlem Railroad structure and thus to and across the Harlem River. With respect to the mode of construction of the railroad, the Board reached the conclusion that the plans adopted by the former Commission were, in the main, wisely devised; except that it was thought desirable, among other things, to increase the width of the railroad as a measure of safety, and to omit the requirement that the work of construction under Broadway should be done without disturbing the surface.

A statement of all of the plans and propositions which were considered at this period by the Board, and of the constant surveys and investigations which were made by its Engineer would be at this time unprofitable. The location of all the mains, pipes and other subway structures along the line of the proposed railroad,—which was a task of the utmost difficulty,—was completed by Mr. Parsons, who also prepared a valuable set of maps showing the extent to which the foundations and vaults of all buildings upon the proposed routes encroached upon the streets affected by the plans of the Board. An elaborate study of the nature of the soil and the situation of rock under the surface of the proposed route was also made at the same time.

The Board concluded that it would be advisable, even from the standpoint of rapid transit, to construct pipe galleries on either side of the proposed railroad on the Broadway route from Park Place to Thirty-fourth Street. For although it was clear that the construction of such galleries must encroach upon the property owners' vaults, and that it would add very materially to the expense, the Board was of the opinion that as there must in any event be a costly re-location of the pipes, it would be wiser and cheaper in the long run to construct pipe galleries as a part of the rapid transit plan, thus avoiding forever the necessity of further excavation of the streets for the purpose of repairs.

In the formulation of a tentative plan, and in conducting the necessary incidental investigations, the Board was not unmindful of the necessity of keeping its work within the limit of expenditure prescribed by the statute. Estimates made by Mr. Par-

sons, with the assistance of Messrs. Alphonse Fteley and Theodore Cooper, who had been retained by the Board for the purpose of examining the provisional plans, indicated that, if the railroad were to be constructed to the extreme northerly limits of the City, the cost of construction might, when due allowance was made for contingencies, exceed the sum of Fifty million dollars.

Under these circumstances the Board adopted a resolution on December 26, 1894, authorizing the President to submit the provisional scheme of Mr. Parsons to a Board of Experts for examination and report.

Acting under the authority thus conferred upon him, Mr. Orr, the President of the Board, after consultation with his associates, appointed Messrs. Abram S. Hewitt, Thomas C. Clarke, Charles SooySmith, Octave Chanute and Prof. William H. Burr; and the gentlemen thus named at once entered upon an examination of the important questions thus referred to them.

#### AMENDMENTS OF THE RAPID TRANSIT ACT.

By this time the experience of the Board had satisfied its members that numerous sections of the Act of 1894 required amendment, partly in order to eliminate certain provisions which were not in the original draft, but which had been inserted by the Legislature at the time of its passage; and partly to provide for various contingencies which had not been foreseen when the bill was originally prepared, including the plan to build pipe galleries along a portion of the route. A bill was accordingly drawn by counsel, which, being approved by the Board, was enacted by the Legislature of 1895 (Laws 1895, Chap. 519).

This statute amended the former acts in numerous and important respects. It provided, among other things, that the City should extinguish all easements of abutting property holders which might be affected by the construction of the railroad, thus guaranteeing the contractor against the class of litigation which had proved so serious to the elevated railroads, and authorized the expenditure by the City of an additional sum of \$5,000,000 for that purpose. The act also authorized the Board, in its discretion, to permit the contractor to postpone the construction of

any part of the railroad as planned until such time as, in the judgment of the Board, the interest of the City demanded that such postponed section should be completed. With respect to the power of the Board to grant additional franchises to existing railroads, it substituted a provision that such grants might be made by six members of the Board for the former requirement of a unanimous vote; but it imposed as a limitation upon this power, that any such grant should require the corporation which received it to make proper compensation to the City, and that such compensation should be subject to re-adjustment at the expiration of successive periods to be fixed by the Board, none of which should exceed in duration the period of thirty-five years.

#### REPORT OF BOARD OF EXPERTS.

Prior to the taking effect of this act, and on the 29th day of January, 1895, the Board of Experts, appointed in the manner and for the purposes already recounted, presented its report. Although the new practical recommendations contained in this valuable paper were not, in general, accepted by this Board, yet it presents so clearly the nature of the problems with which the Board was called upon to deal, that a summary of the report is inserted:

The Board of Experts approved the estimates of the Engineer, showing that the construction if carried to the City line on both the east and west sides would cost \$50,000,000. It also approved the suggestion of the Chief Engineer that the subway should be widened from the plans of the previous Commission from 44 to 50 feet for a four-track road, and it also was of the opinion that a separation on Broadway of the local and express lines as proposed by the Engineer was practicable and wise.

The Board of Experts, in answer to the question as to whether any better solution of the problem than has already been brought forward could be suggested, proposed if the route laid down by the Commission be adhered to, a plan of construction consisting of two tracks from the South Ferry to the City Hall, and thence along Broadway with four tracks to Ninety-second Street, at which point it suggested that the tracks should emerge and be continued

on an elevated structure to Morningside Plateau, and thence partly by depressed road, partly by tunnel and partly by viaduct to One Hundred and Eighty-first Street. The cost of this was estimated by the Board of Experts at \$29,500,000. The Board, however, recommended a change from this route by substituting Ehu Street, Lafayette Place and Fourth Avenue as the route between the City Hall Park and Fourteenth Street, in lieu of Broadway, involving, as estimated by the Experts, a saving of \$3,700,000; and further recommended that above Fourteenth Street two express tracks be carried along Broadway in a tunnel in the rock to Twenty-fifth Street, and that four tracks be constructed along Fourth Avenue to Twenty-third Street, and then two tracks for local service through Twenty-third Street and under Madison Square to Twenty-fifth Street, above which point the regular four-track system as previously described would be resumed on Broadway.

For the east-side line the Board of Experts recommended the construction of four tracks under Fourth Avenue from Twenty-third Street to Forty-second Street, and thence under the Grand Central Station with two tracks to Ninety-seventh Street, and thence by a two-track elevated structure to Mott Haven, a point where the existing lines of travel might be easily made to converge.

In addition to this route the Board of Experts recommended that two tracks be constructed in tunnel under Forty-second Street, or one of the adjacent streets to a connection with the west-side route on Broadway. The cost of the line thus recommended above Twenty-third Street on the east side, including the Forty-second Street side as far west as Broadway, was estimated by the Experts to cost \$12,025,166. The total cost of the lines as recommended by the Experts was estimated by them, including an allowance of 10% for terminals and side tracks, to amount to \$42,063,721.

The Experts also suggested a two-track elevated extension from the Fourth Avenue line westward on one of the streets just north of Central Park to a point near Sixth Avenue, and thence northerly through the blocks to the Harlem River. The length of this line would be approximately two miles, and its cost, assuming the amount paid for right of way through the blocks to be \$25,000 per lot, to be approximately \$2,500,000. They pointed out that it



was perfectly feasible and ultimately desirable to extend the west-side line from One Hundred and Eighty-fifth Street by a two-track elevated structure to Kingsbridge to connect there with the New York Central Railroad at an estimated cost of \$1,500,000, and finally recommended the improvement of existing facilities by the extension of the New York Central tracks along the North River front below Fifty-ninth Street by an elevated structure, and by the immediate addition of a third track to each of the lines of the Manhattan system.

#### THE ROUTE AND PLANS OF 1895.

The report just quoted formed for many weeks a subject of the closest attention on the part of the Board, which finally concluded, although after much hesitation, that in view of the greater convenience of the Broadway route to the great majority of passengers, of the high probability that a rapid transit road on that route must at some time be adopted, of the greater economy of its construction at that time, and of the fact that the project for widening New Elm Street then seemed destined to an indefinite delay, during which that thoroughfare would not be available for the purpose of constructing the railroad, it was wiser to adhere to the Broadway route. And the Board also concluded with respect to the method of construction to be adopted on Broadway, that the project of placing all four tracks upon substantially the same level and so near the surface as to obviate the use of long stairways or elevators, outweighed any advantage to be gained by placing the local tracks and the express tracks upon different levels.

In view of the fact that the estimates of its Engineer, as approved and confirmed by the Board of Experts, showed that there was no certainty that the entire line of railroad, as planned along the Broadway route, could be constructed within the available limit of expenditure, the Board resolved that the west-side branch should be terminated at One Hundred and Eighty-fifth Street, and the east-side branch at One Hundred and Forty-sixth Street.

The result of these deliberations was fully expressed in a resolution adopted and transmitted by the Board to the Common Council on May 9, 1895, in which the routes were defined as follows:

"A route the centre line of which commences at a point under the westerly line or side of Whitehall Street, distant along the same 62.5 feet north from the northerly line or side of South Street produced, and proceeds thence in opposite directions and along two diverging lines which form a loop at or near Battery Park and converge to parallelism at or near the westerly line or side of State Street and the southerly line or side of Battery Place, and all of said loop being under Battery Place, Battery Park, State Street and that portion of Whitehall Street which lies to the west of the centre line thereof and between the southerly line or side of State Street produced and the South Ferry. The said centre line thence from said place of converging proceeds under Broadway and Union Square to Fifty-ninth Street; thence under the Boulevard to a point at or near One Hundred and Twenty-fourth Street; thence by viaduct along the Boulevard to a point at or near One Hundred and Thirty-fourth Street; and thence under the Boulevard and Eleventh Avenue to a point at or near One Hundred and Eighty-fifth Street. Also a loop at City Hall Park connecting with the route aforesaid at Broadway at or near Mail Street, the centre line of which loop proceeds from Broadway, under Mail Street, and thence under City Hall Park, Park Row and Chambers Street, to connect again with the Broadway line at Chambers Street. Also a connection along Park Row, from said loop last mentioned, the centre line of said connection beginning at a point in Park Row at the terminus of the New York and Brooklyn Bridge; thence proceeding under Park Row to Broadway, and there connecting with the said route on Broadway at or near Fulton Street.

"Also a route, the centre line of which shall diverge from the Broadway line at or near Fourteenth Street, and run under Union Square to Fourth Avenue; thence under Fourth and Park Avenues to a point at or near Ninety-eighth Street; thence by viaduct along Park Avenue to Harlem River; thence turning to the right by bridge across the Harlem River and thence turning to the left until the line shall coincide with the centre line of Walton Avenue produced at or near its intersection with One Hundred and Thirty-eighth Street; and thence along the line of Walton Avenue to a point at or near One Hundred and Forty-sixth Street."

By the same resolution the mode of construction was specified. There were to be four tracks from Broadway and Park Place up to One Hundred and Thirty-fifth Street, on the west side; and four tracks on the east side, from Union Square to the Grand

Central Station. Elsewhere there were to be two tracks. All tracks were to be run on the same level and were to be of the standard gauge of four feet eight and one-half inches between the rails. Twelve feet and a half in width was allowed for each track. The entire line was to be in tunnel, except the viaduct on the Boulevard, from One Hundred and Twenty-fourth to One Hundred and Thirty-fourth Streets, and except the east-side line from Ninety-eighth Street northward. The roof of the tunnel was to be placed as near as possible to the surface of the street. It was to be not less than twelve feet in height in the clear. North from the Grand Central Station there were to be two separate tunnels along Fourth Avenue as far as Ninety-sixth Street,—one on each side of the existing tunnel; and thence on two separate viaducts, one on each side of the existing structure. The Harlem River was to be crossed by a double track drawbridge.

Along Broadway,—from Park Place to Thirty-fourth Street,—all pipes, sewers and other sub-surface structures were to be placed in galleries.

ROUTE APPROVED BY CITY BUT DISAPPROVED BY THE SUPREME COURT.

During the summer of 1895 and concurrently with the application of the Board to the local authorities for their consent to the construction and operation of the railroad as then proposed—which consent was granted in due course—an unsuccessful effort was made to obtain the consent of the property-holders along the route of the proposed railroad. An application for the substituted consent of the Supreme Court, therefore, became necessary.

Upon applying for a formal order designating the newspapers in which to publish notice of the intended application, the Court, however, refused to consider the question at all, and entered an order to that effect on October 7, 1895. This order was reversed by the Court of Appeals on October 22, 1895 (*In re Rapid Transit Commissioners*, 147 N. Y. 260), and the Supreme Court was directed to deal with the application on its merits.

The Supreme Court having thus been set in motion, an order was entered November 25, 1895, appointing Messrs. Frederic R. Coudert, George Sherman and William H. Gelshehen as Commis-

sioners to take testimony and report whether the proposed railroad ought to be constructed.

A very large amount of testimony,—mainly of expert witnesses,—was presented both on behalf of the Rapid Transit Commissioners and of those property-owners who opposed their projects. The plans of the Commission were thus subjected to a most searching and critical examination, and it is not too much to say that this minute and often hostile study has contributed greatly to perfecting the plans now under execution.

The long and earnestly contested controversy before the Commissioners was ended by their unanimous report to the General Term of the Supreme Court on March 6, 1896, to the effect that in their opinion the proposed road ought to be constructed.

The matter then came up and was argued fully before the Court, which, on May 22, 1896, unanimously refused to confirm the report of its Commissioners (*Matter of Rapid Transit Comm., 5 App. Div. 290*). The reasons assigned were, among others, that the road, when constructed, would not furnish a complete system of transit from one end of the City to the other; that it was doubtful whether any large part of the road could be built with the money then at the disposal of the City; and that it was certain the expenditure of so vast a sum would take away the City's power to engage in any other public work and might possibly so impair its credit that it could not recover in the course of many years. Specifically it seemed plain that the Court would not consent to any route under Broadway, or to the construction of an underground road on any other route unless (1) it extended substantially from one end of the City to the other and (2) it was conclusively shown that the total cost would be much less than \$50,000,000.

#### RAPID TRANSIT ACT HELD TO BE CONSTITUTIONAL.

While the above proceeding was pending still other litigation of a most important character required the attention of the Board—an action having been brought by the Sun Printing and Publishing Association and others, as taxpayers, for the purpose of enjoining the City from employing its funds for the construe-

tion of the proposed railroad, upon the ground that the Rapid Transit Act of 1894 was unconstitutional in many of its features, and hence afforded no legal warrant for the proposed expenditure.

This action was decided adversely to the plaintiffs on February 20, 1896, by Mr. Justice Truax, sitting at Special Term of the Supreme Court, and subsequent appeals resulted in the affirmance of this decision by the Appellate Division of the Supreme Court in July, 1896 (*Sun vs. Mayor*, 8 App. Div. 230), and by the Court of Appeals on March 23, 1897 (*Sun vs. Mayor*, 152 N. Y. 257). These important and interesting decisions set at rest the vital question of the constitutionality of the legislation underlying the rapid transit enterprise, and entirely justified the wisdom and foresight with which the scheme had been devised.

#### RE-EXAMINATION OF ROUTE AND PLANS.

The action of the Appellate Division of the Supreme Court in refusing its consent to the construction of the railroad upon the route and according to the plan theretofore adopted by the Board led to earnest discussion in the press and elsewhere. So great was the interest excited that many letters were written to the Board by persons standing high in the community, urging a continuance of the work; and numerous public meetings were held, at which resolutions were adopted urging the Board to continue its efforts to find some solution of the problem committed to it, and pledging support to the further efforts of the Board.

Although the reasoning of the judges seemed, at first sight, to amount to an absolute prohibition of municipal construction on any terms, yet further consideration led to the conclusion that all hope of a successful issue need not be abandoned. The action of the Court might be construed as being merely a condemnation of the particular plan presented for its consideration; and in so far as the opinions seemed to foreshadow a refusal on the part of the Court to consent to any practicable plan of municipal construction, they were capable of being regarded as so far extrajudicial as not to be binding upon the future action of the Court. The Court, indeed, might be expected, in view of the popular demand for some system of rapid transit, to consider with an open

mind any new plan which did not conflict too seriously with the views held by its members, as outlined in the two opinions rendered.

Urged by these considerations, and by an anxious desire to use every possible effort to carry into effect the important duties with which they were charged, a majority of the members of the Board concluded, after a period of hesitation, to make still another effort to find some solution of the problem before them.

Following close upon the announcement of the fact that the Rapid Transit Board would continue its efforts to secure the construction of a rapid transit railroad for and at the expense of the City, came an application from the Manhattan Railway Company that the Board would authorize it to build elevated railroads over a number of additional streets.

This application was vague and indefinite in some respects, and, in still others, it sought for privileges which the Board had no power to grant. A communication was accordingly sent to the Railway Company on August 6, 1896, pointing out these defects and suggesting that an amended application be filed. No reply was returned to this communication, nor did the Board receive any further intimation that the Manhattan Railway Company desired to extend its lines until, after the lapse of eighteen months, it had become evident that the Rapid Transit Railroad was likely to be constructed by the City.

During the year 1896 the Board was deprived of the services of Mr. Lcw, who resigned on June 2; of Mr. Inman, who died on November 5; and of Mr. Steinway, who died on November 30. The vacancies thus created were filled by the Board by the election on November 19, 1896, of Mr. Woodbury Langdon, as Mr. Low's successor, and of Mr. George L. Rives, as Mr. Inman's successor; and by the election of Mr. Charles Stewart Smith, as Mr. Steinway's successor, on December 10.

In the meantime, and as the result of numerous conferences with persons whom it deemed well qualified to act as its advisers, the Board concluded, provisionally, to adopt what may be called the "Elm Street route" for its main line. Careful investigations as to the practicability of this route had been made by Mr. Parsons, with the result that on November 12 he presented a long and

elaborate report, in which, in addition to referring to numerous alternative routes which had been suggested, and presenting careful statements as to the physical conditions of each of such routes and its relative advantages so far as the cost of construction was concerned, he spoke of the so-called "Elm Street route" as follows:

"Along the critical portion of the proposed route, *i.e.*, Elm Street, there was no information at hand showing the kind of material that would be encountered in excavating. I therefore caused to be made a series of borings, similar to those made along Broadway. This system of borings commenced at the corner of Chambers and Elm Streets and extended to the corner of Fourth Avenue and Thirty-third Street, so that definite knowledge has been obtained as to the sub-surface material. Above Thirty-third Street the result of inquiries made of architects and builders, and the recorded data of sewer excavations of the Department of Public Works, have been sufficient to determine the probable rock line, with enough accuracy for this stage of the proceedings.

"The nature of and the variations in the soil have been plotted and accompany this report. While the soil underlying Elm Street is very variable in character, more so in fact than was the case in Broadway, it is nevertheless, an excellent material in which to conduct such construction as is proposed, being, with but few exceptions, a sharp silica sand, ranging in quality from what might be termed a good fine sand and gravel mixed, the latter material being found in large quantities. The few exceptions above referred to are streaks or deposits of clay, or elay and sand mixed.

"To the depth for which the excavation for the railway will be made, there was no material found which would slide or give difficulty in handling, while much of it is a sand of such excellent building quality that it would pay the contractor to store and use it in the mixing of the mortar and concrete required on the work.

"Rock is met with first at Twelfth Street, and is found, as a general thing, at or near rail level from there to Thirty-third Street, providing an excellent foundation along Fourth Avenue. Above Thirty-third Street, and on both the east and west-side routes, the rock surface undulates greatly and consequently a considerable portion of the excavation will be in that material, but to no greater extent than was anticipated in the original estimates for the same routes.

"At the time of making borings along Elm Street, the opportunity was availed of to determine the elevation of ground in standing

water, which was found, in general, to be about one foot above the level of mean high tide. If the new street grade at Pearl Street is changed in accordance with the suggestions made to your Board, September 9, and subsequently laid before the Board of Street Opening, the only part of the route where the rail level will lie below tide water will be along Elm Street, from Leonard Street to a point midway between Howard and Grand Streets, a distance of 1,600 feet, with a maximum depth below tide water of only  $5\frac{1}{2}$  feet.

"Maps showing the existing sewers, water-mains, gas-pipes and electrical subways, have been prepared and a tolerably complete study made as to their reorganization, especially in respect to the sewers. Elm Street lies nearer the dividing ridge of the city's drainage system than does Broadway, and the taking of the sewers will therefore be of less serious moment. The Canal Street sewer can be treated in a similar manner to that proposed in the case of Broadway, and approved by the Engineer of Sewers of the Department of Public Works, that is to say, to cut it at the place where the railroad crosses and build a new sewer to the East River, and to turn into that stream the flow from the district lying north of Canal Street and east of Elm Street, which now passes west through the Canal Street sewer into the Hudson River. The amount of sewage so diverted will be less than was proposed with Broadway, as the district affected is not so great, and therefore the new sewer will be of smaller size than was previously anticipated.

"No part of the route as herein contemplated is a main thoroughfare for water and gas pipes, or electrical subways, while Elm Street, being at present with no outlet at either end, contains no pipe of large size, and what pipes are there now will all be replaced on the opening and construction of the new street.

"At Fifth Avenue and Forty-second Street there occurs the most serious pipe crossing along the route, as the large Croton water-mains run down the avenue. Fifth Avenue, however, at that point forms a decided ridge, the surface of Forty-second Street falling rapidly both to the east and west. In order to have suitable gradients for operating a railway, it would be desirable to pass sufficiently below the level of the avenue to leave all the water and gas pipes undisturbed overhead.

"The portions of the proposed route that formed a part of the route previously adopted were recognized as presenting no serious difficulty in construction. The physical investigations and survey of the newly considered portions show that they contain no features that will cause



the road to be excessively expensive, slow or difficult to build, and the proposed route, therefore, escapes entirely the difficulties to construction which were present along Broadway, incident to the heavy traffic, cable railways, complications of sub-surface structures and the care of abutting buildings. The work can be attacked at as many points as can be conveniently operated at once, and the whole brought rapidly to completion at the same time."

The discussion as to the route and general plan was continued, in the light cast upon the entire subject by the former experience of the Board and with the aid of numerous engineers, contractors and real estate owners, who were consulted by it. The Board had also constantly in mind the chief practical limitations imposed by the Appellate Division of the Supreme Court,—namely, that it must extend from one end of the City to the other and must cost much less than \$50,000,000.

#### THE ROUTE AND PLANS OF 1897.

On January 14, 1897, a resolution was adopted establishing the present route and plan as follows:

"One route as follows: Its centre line shall commence at a point at or near the intersection of Broadway with Park Row; thence under Park Row and Centre Street to a point at or near its intersection with New Elm Street as proposed; thence under New Elm Street, as proposed, to Lafayette Place; thence under Lafayette Place to Eighth Street; thence across and under Eighth Street, and thence under private property lying between Eighth and Ninth Streets and east of the westerly side or line of Lafayette Place, produced, to Fourth Avenue; thence under Fourth Avenue and Park Avenue to Forty-second Street; thence turning from Park Avenue into Forty-second Street, and taking for the purposes of the curve, if necessary or convenient, private property at the southwest corner of Park Avenue and Forty-second Street; thence under Forty-second Street to Broadway; thence under Broadway to Fifty-ninth Street; thence under the Boulevard to a point at or near One Hundred and Twenty-fourth Street; thence by viaduct along and over the Boulevard to a point at or near One Hundred and Thirty-fourth Street; thence under the Boulevard and Eleventh Avenue to a point on Eleventh Avenue, situate north of One Hundred and Ninetieth Street, and distant therefrom not less than one thousand and not more than one thousand five

hundred feet, and thence under or over (as may be most convenient) private property to a point at the southeast end of Ellwood Street near Hillside Street, and thence over Ellwood Street to Kingsbridge Avenue or Broadway; thence over Kingsbridge Avenue or Broadway as now proposed to Riverside Avenue and thence easterly over Riverdale Avenue to a point within five hundred feet of the present Kingsbridge station of the New York and Putnam Railroad Company.

"This route shall include a loop at the City Hall Park which shall connect with the portion of the route aforesaid along Centre Street at or near the South end of that street, and thence proceed westerly and southerly under City Hall Park and Broadway and thence easterly to again connect with the portion of the route aforesaid in Park Row. All of the said loop shall lie under City Hall Park, Park Row, between the south end of Centre Street and Ann Street, and the portion of Broadway adjoining the City Hall Park lying between Vesey and Murray Streets. This route shall also include suitable tracks and connections from the City Hall loop to the Post Office, such tracks and connections being under the City Hall Park and under the portion of Park Row between the South end of Centre Street and Ann Street. This route shall also include suitable tracks and connections from the portion of the route near the corner of Park Avenue and Forty-second Street to the yard and tracks of the Grand Central Station. All of the tracks and connections last mentioned shall be under Park Avenue and Forty-second Street and private property to be acquired. By private property in this description is meant property not forming part of the streets of the City of New York and not belonging to the City of New York.

"Also a route as follows: Its centre line shall diverge from the route aforesaid on the Boulevard, between a line parallel to and one hundred feet north of One Hundred and Third Street and a line parallel to and one hundred feet south of One Hundred and Third Street; thence under private property to a point in One Hundred and Fourth Street; thence under One Hundred and Fourth Street to and across Central Park West; thence under Central Park to the intersection of Lenox Avenue and One Hundred and Tenth Street; thence under Lenox Avenue to a point near One Hundred and Forty-second Street; thence curving to the east and passing under private property, One Hundred and Forty-third and One Hundred and Forty-fourth Streets, to the Harlem River at or near the foot of One Hundred and Forty-fifth Street; thence under the Harlem River and private property to East One Hundred and Forty-ninth Street at or near its in-

tersection with River Avenue; thence under East One Hundred and Forty-ninth Street to a point near its intersection with Third Avenue; thence with a curve to the left and under Third Avenue to a point near its intersection with Westchester Avenue; thence with a curve to the right to and under Westchester Avenue, and thence by viaduct over and along Westchester Avenue to the Southern Boulevard; thence over and along the Southern Boulevard to the Boston Road, and thence over and along the Boston Road to Bronx Park.

"The said general plan of construction hereby adopted, is as follows:—

"For the route under Park Row and the said loop at City Hall Park, two parallel tracks; for the route from the point of connection of the City Hall loop with the route aforesaid at the southerly end of Centre Street to the junction at or near One Hundred and Third Street and the Boulevard, four parallel tracks; for the route from the junction at or near One Hundred and Third Street and the Boulevard to the New York and Putnam Railroad Company's station at Kingsbridge, two parallel tracks; for the route from the junction at or near One Hundred and Third Street and the Boulevard to Bronx Park, two parallel tracks.

"All of the above-mentioned tracks shall be placed on the same level, except that wherever required by special necessities of surface or subsurface structures, or other special or local necessities and for the purpose of avoiding grade crossings at the southerly end of Centre Street and the One Hundred and Tenth Street junction, any one or more of the tracks may be depressed below the level of the other tracks to a depth of not more than twenty feet.

"The tracks shall be of standard gauge, that is to say, of a width of four feet and eight and a half inches between the rails. There shall be twelve and a half feet width in the tunnels and on the viaducts for each track, except that at stations, switches, turnouts, curves and crossovers the width may be increased to the extent permitted by the width of the tunnel. The tracks wherever passing over or under the street shall be placed over or under the central part of the street, except that no tunnel or viaduct or any wall or part thereof under or along a street shall, except at the stations, station approaches, curves and at places of access to subsurface structures, as hereinafter provided, be within a distance of five feet of the exterior line or side of the street. The tracks shall in all cases be placed in tunnels, except only that on the west-side route on the Boulevard at or near One Hundred and Twenty-fourth Street the

tracks shall emerge from the tunnel and be carried upon a viaduct along the Boulevard to a point at or near One Hundred and Thirty-fourth Street and thence be taken again into tunnel, and except also that on the west-side route at a point at or near One Hundred and Ninetieth Street the tracks shall again emerge from the tunnel and be carried upon a viaduct over private property and the above-mentioned streets to the Kingsbridge Station, and except also that on the east-side from a point on Westchester Avenue at or near Bergen Avenue the tracks shall emerge from the tunnel and be carried upon a viaduct over and along Westchester Avenue and the other streets above mentioned to Bronx Park.

"Wherever the tracks change from tunnel to viaduct, or from viaduct to tunnel, the change shall be so made as to occupy or obstruct the use of the surface of the street to the least possible extent consistent with the proper gradient for the tracks.

"The roof of the tunnel shall be as near the surface of the street as street conditions and grades will permit. The tunnel shall not be less than thirteen feet in height in the clear. The maximum widths of the tunnel in the clear shall be as follows:

"For the route under Park Row and the City Hall Park loop, thirty-eight feet; for the route from, at or near the south end of Centre Street and to the commencement of New Elm Street, fifty feet; for the route from, at or near the commencement of New Elm Street to Lafayette Place, sixty-eight feet; for the route from, at or near the commencement of Lafayette Place to the junction at or near One Hundred and Third Street, fifty feet; for the west-side route from the junction at or near One Hundred and Third Street to Kingsbridge Station, twenty-five feet; and for the east-side route from, at or near the junction at One Hundred and Third Street to Bronx Park, twenty-five feet; except that wherever the nature of the streets necessitates a curve that an additional width of tunnel may be added not exceeding three feet for each track, and except that on Fourth Avenue, from Thirty-second Street to Forty-third Street, the permissible width shall be sixty-five feet; and for the tunnel beneath the Harlem River and its approaches, the permissible width shall be thirty-five feet. At each cross street where accommodations for pipes, wires, sewers and other subsurface structures have been provided within the tunnel, the tunnel may, in order to provide convenient access to such pipes, wires, sewers and other subsurface structures, have, within the limit of the sides or exterior lines of such cross street or such lines produced, an additional width on each side

of the route not to exceed fifteen feet, and the area of additional width on either side not to approach nearer than twelve feet to either side or exterior line of such cross street. Footways between the tracks shall be provided the whole length of the line and accommodations arranged for the convenience and protection of employees.

"Whenever necessary for the proper support of the street surface, the roof of the tunnel shall be of iron or steel girders with brick or concrete arches supported by iron or steel columns and masonry walls, or the roof shall be a masonry arch. Viaducts shall be built with a width of twelve and one-half feet for each track and with an additional width of three feet on each side for outside footways. Viaducts may be built of metal or masonry, or both.

"Adjacent tracks shall be connected by necessary and suitable switches and connections, and an additional track for siding accommodations may be constructed not to exceed in length one quarter of a mile for each mile of roadway, but provided always that the side of the tunnel shall not, by the enlargement of the tunnel for that purpose, be brought within five feet of the exterior line or side of the street.

"Along Elm Street, wherever the tunnel shall be in the clear not less than sixty-eight feet wide, the pipes, wires, sewers and other subsurface structures shall be placed in suitable galleries in the tunnel at the outside of the exterior tracks. But any such pipes, wires, sewers and other subsurface structures may be placed in suitable galleries beneath the tracks, or such pipes, wires, sewers and other subsurface structures may be placed in the ground above or at the sides of the tunnel, or at the outside of the exterior tracks, and whenever so placed beneath the tracks, or in the ground above or at the sides of the tunnel, the width of the tunnel on New Elm Street shall not be more than fifty feet. Pipes, wires, sewers and other subsurface structures shall, at any part of the said routes, be removed or disturbed when necessary for the construction and operation of the railway, and, if removed or disturbed, shall be placed under the streets in such manner and in such location that the use and service thereof shall not be impaired. Such pipes, wires, sewers and other subsurface structures shall be left or shall be so arranged as to give free access for their repair or alteration, or for the placing with them of new pipes, wires, sewers and other like structures, and for making connections between the same and buildings at any time.

"Stations and station approaches shall in general, be at the intersections of streets and shall be built under, or, if the position of the

tracks so require, over, the streets and immediately adjoining private abutting property, or through private property to be acquired for the purpose, or both under or over streets and through private property as aforesaid, except that on the Boulevard, stations and station approaches may be in the centre of the street. The streets under or over which stations or station approaches shall be built may include cross streets, but no part of any cross street shall be used for a station approach at a distance greater than seventy-five feet from the exterior line or side of the street of the route. The word "street," wherever used herein, shall include an avenue or public place.

"Along the Boulevard there may be openings in the surface of the street from the tunnel for the purpose of ventilation and light; such openings shall be guarded by convenient and ornamental enclosures. The openings shall not exceed twenty feet in width and fifty feet in length. No two openings shall be within fifty feet of each other. No opening or part thereof shall be within the limits of, or opposite to, any street intersecting the Boulevard; and within the distance of any one block on the Boulevard between any two adjacent crossing streets there shall not be more than two such openings.

"The general mode of operation shall be by electricity or some other power not requiring combustion within the tunnels or on the viaducts, and the motors shall be capable of moving trains at a speed of not less than forty miles per hour for long distances, exclusive of stops.

"The manner of construction shall be by tunneling or open excavation."

The scheme thus adopted complied, it was hoped, with the requirements of the Appellate Division. In the first place the road was estimated to cost about \$35,000,000, and that this estimate was correct time has since conclusively proved. In the second place, it ran from the City Hall,—or near the southerly end of Manhattan Island,—to Kingsbridge as the terminus of one branch and to the Bronx Park as the terminus of the other. At Kingsbridge a physical connection with the New York Central lines to Yonkers and beyond was easy. At the Bronx Park the northerly limits of the City were nearly reached; and if the Court had insisted on a further extension here, it would have cost little, comparatively, to extend the road still farther by an elevated structure through the Park.

The necessity of avoiding Broadway, below Thirty-fourth Street, so as to meet the views of the Court, compelled the use of Fourth Avenue and Elm Street for the main stem, and the introduction of an awkward alignment from Fourth Avenue to the westward along Forty-second Street to Broadway.

It was thought impossible to provide in this scheme for a line on the east side from the Grand Central Station to the Harlem. The cost of such a line would have brought the total expense up to figures that the Supreme Court was not expected to sanction, even if the west-side line had been made only a two-track road.

A four-track road, carried as far north as possible, was regarded by the Board as essential to real rapid transit. A two-track road forbids the use of express trains, and necessarily reduces the speed of all trains to the speed of the slowest. Upon the fullest consideration, therefore, the Board determined to abandon an east-side line, and to provide for a four-track service to the neighborhood of One Hundredth Street; and from that point to send off an easterly branch, which should follow the line, not of Fourth, but of Lenox Avenue, and from the termination of that street should cross the Harlem.

This route appeared to the Board the best that could at that time be devised to meet the conditions imposed; and it seemed probable that, if this system proved a success, additional lines might subsequently be built which would supply some rather obvious defects in the plan adopted. Moreover, the Board believed that the section of the City east of Central Park was already better provided with transit facilities than most other quarters.

In one very important particular the plan of 1897 involved an important departure from the plan of 1895. The entire line of the road on Manhattan Island was to be in tunnel, except for the short distance between Fort George and Kingsbridge. In the Borough of The Bronx the road was to be in tunnel from the Harlem River to a point on Westchester Avenue some distance east of Third Avenue. The Board was not willing to gain in cheapness by sacrificing important streets to elevated railways.

It has already been pointed out that the southerly terminus of the route thus adopted was at Park Row, and this fact is also

to be explained by the statement that, although the Board was of the opinion that the route ought to be extended along Broadway to the South Ferry, it was unwilling, in view of *dicta* contained in the opinions of the Appellate Division, to risk a condemnation of its entire plan, unless the owners of property upon that portion of Broadway affected by its route, should by consenting to the construction of the railroad, render unnecessary a recourse to the courts.

As soon as this fact became known there ensued an agitation among the owners of property along the southerly end of Broadway in favor of the extension of the railroad along that route, with the result that, after a few weeks a petition was presented to the Board in favor of such extension signed by a majority, in value, of the owners of all of the property which would be affected by such extension. The Board accordingly adopted a resolution on April 1, 1897, providing for a two-track extension of the railroad to the south under Broadway to Battery Place, with a loop under Battery Park, Whitehall Street and State Street. The Board subsequently abandoned this extension, however, owing to the refusal of the Park Commissioners to grant a consent to its construction.

#### ROUTE APPROVED BY THE SUPREME COURT.

All the local authorities consented to the construction and operation of the railroad from the Post Office north, upon the route and according to the plan adopted by the resolution of January 14. After a futile effort to obtain the consents of the property holders along the route—in the course of which the Board received the voluntary assistance of a number of the largest property owners in the City—an application to the Appellate Division for the appointment of commissioners to inquire and report whether such railroad ought to be constructed and operated, resulted in the appointment of Messrs. Arthur D. Williams, John Sabine Smith and George W. Young as such commissioners, in July, 1897.

Interests adverse to the construction of the Rapid Transit Railroad again made vigorous opposition before this second commission; but the controversy was terminated, after another great mass of testimony had been introduced, by a unanimous report,



dated November 6, 1897, to the effect that the proposed Rapid Transit Railroad ought to be constructed and operated.

In the meantime the Board had caused the detailed plans and specifications for the railroad to be prepared by Mr. Parsons, and, having agreed provisionally regarding such plans and specifications, caused them to be carefully examined by Messrs. George S. Morison and Howard A. Carson, by whom they were in all respects approved.

On December 17, 1897, a decision was rendered by the Appellate Division of the Supreme Court upon a motion to confirm the report of the Williams commission. A majority of the Court expressed the opinion that such motion should be granted, but, in order, as the opinion said, to give "some assurance that the powers of the Rapid Transit Commissioners in respect to security, should be exercised so as to protect the interests of the City in a substantial manner," exacted as a condition precedent to the entry of an order confirming the report a requirement that the Rapid Transit Board should file a stipulation that, upon awarding any contract for the construction and operation of the railroad, "the penalty of the bond specified in section 34 of the Rapid Transit Act will be fixed at not less than \$15,000,000."\*

It needed no extended consideration to satisfy the minds of persons familiar with such subjects that, if the Court should persist in exacting a literal compliance with the terms of the conditions thus imposed by it, its action would amount to an absolute veto of the entire plan of municipal construction; but, as it seemed desirable that all facts bearing upon the question should be carefully collected, with a view to a possible application to the Court for a modification of its requirement, a resolution was adopted by the Board on December 18, whereby it was referred to a sub-committee to ascertain and report whether it was practicable to obtain such a bond, and, if it were deemed impracticable, to ascertain and report what security in money, bonds or otherwise, could probably be obtained from responsible bidders.

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\* One member of the Court dissented, being of the opinion that the consent of the Court should be absolutely refused. (See opinions reported in *Matter of Rapid Transit Comm.*, 23 App. Div. 472).

#### DELAYS ARISING FROM CONSOLIDATION.

With the opening of the year 1898, Robert A. Van Wyck, who had been elected as Mayor, and Bird S. Coler, who had been elected as Comptroller, became *ex-officio* members of the Board in place of Messrs. Strong and Fitch, whose respective terms as Mayor and Comptroller had expired, and the Board found itself confronted with the very serious questions affecting the financial condition of the City to which the enactment of the Greater New York Charter, which took effect on January 1, had given rise.

The financial condition of the City of New York as it existed prior to the new charter had been exceedingly strong. Although the assessed value of the real estate within its borders had been moderate, compared with its actual value, the bonded debt was well within the ten per cent. limit imposed by the Constitution, and was so rapidly reduced through the operation of the sinking fund that there could be no doubt of the capacity of the City to issue such bonds as might be needed for the construction of the Rapid Transit Railroad, and for other needful purposes, without any abnormal increase in the assessed value of its property. The situation of the outlying territories, which were then consolidated with the old city was, however, widely different. Not only was their real estate generally assessed at a much higher relative value than the real estate in the former City of New York, but their percentage of indebtedness to such assessed valuation was also much greater. One immediate effect of the enactment of the new charter, which compelled the City to assume the aggregate indebtedness of all of the territory which it consolidated, was, therefore, to reduce the debt incurring capacity of the new City to a very narrow limit.

This difficulty proved to be but temporary, since the enormous increase in the assessed valuations of property within the County of New York which was shortly made in order to equalize its value with the assessed valuations in other portions of the City coupled with the redemption of the usual amount of outstanding

securities, soon resulted in giving such a margin as would amply suffice for the construction of the Rapid Transit Railroad without trenching upon the ten per cent. limitation. But for the time being, and during the period immediately following the taking effect of the Charter, the exact financial condition of the City was a matter of so much uncertainty as to give some plausible ground for the opinion that the City could not afford to construct the railroad and that the entire project ought to be abandoned. Mayor Van Wyck, in his first message to the Municipal Assembly, in January 1, 1898, expressed a strong opinion that no solution of the rapid transit problem could be worked out through the expenditure of the City's money, and suggested that relief must be obtained by an extension of the facilities of the elevated railroads.

Still another, and very serious effect, of consolidation, was a tendency to array the influence of Kings and Richmond Counties, and of the annexed portion of Queens County, against the scheme. These portions of the enlarged City could derive no immediate or direct advantage from the construction of a railroad within the County of New York, and they were, therefore, naturally opposed to the use of the City's credit for that purpose.

The lapse of time, a more thorough understanding of the plans of the Board and the warm support which has at all times been accorded to the Board by the public and the press, have since resulted in the removal of these obstacles, and in the successful commencement of the work. But it is, nevertheless, true that for a considerable period following the first of January, 1898, the plans of the Board seemed destined to defeat or to indefinite postponement.

The first tangible results of the conditions above referred to were *first*, that the officers of the Manhattan Railway Company made public proclamation that it was their intention to enlarge their system of elevated railways as soon as they could obtain permission from the Board, or from the Legislature, to do so, and *second*, that the Metropolitan Street Railway Company notified the Board, on January 12, 1898, that, as matters then stood, they could not be expected to compete for the contract to construct and operate the Rapid Transit Railway.

THE SECURITY REQUIRED BY THE COURT.

At this juncture a report (dated January 13, 1898) was made by the subcommittee theretofore appointed by the Board to consider what security it was practicable to obtain from bidders for the contract, which clearly exhibits the situation as it then existed. The following are extracts from this report:

*No. 256 Broadway, New York City.  
13th January, 1898.*

TO THE BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS:

By resolution of the Board, adopted on the 18th of December, 1897, it was referred to this committee to ascertain and report whether it would be practicable to obtain, under section 34 of the Rapid Transit Act, the bond suggested in the opinion of the Appellate Division, delivered on December 17, 1897, and, if it were deemed impracticable by the committee, then that the committee report what security in money, bonds or otherwise could be obtained, in its opinion, from responsible bidders.

Your committee respectfully report that they have diligently examined the questions submitted to them; that they have conferred with representatives and counsel of corporations and individuals proposing to bid for the contract for the construction and operation of the rapid transit road and with the representatives of the principal companies authorized by law to become the sureties on bonds, and that they have also considered the general business conditions which must affect the questions of security.

Your committee has somewhat delayed its report in order to hear more explicitly from the Metropolitan Street Railway Company. Two weeks after the decision of the Appellate Division and the appointment of the committee, and when the committee was substantially ready to report, responsible representatives of the Metropolitan Company announced that it had taken up the matter of the proposed contract for construction and operation with a definite expectation that, when the Board should advertise for proposals, their company would submit an offer to enter into the contract, but they desired further time for examination before expressing their views on the question of security. Your committee felt bound to give the

Metropolitan Company the same opportunity which it had given other proposing bidders with whom the committee had conferred. Yesterday the President of the Board, who is chairman of this committee, received from the President of the Metropolitan Company the letter which will be read to the Board when this report is presented. This letter removes the Metropolitan Company from competition for the contract until it shall be determined to what extent, if any, the rapid transit problem is to be solved by the action of the Manhattan Railway Company. So long as such solution by the Elevated Railway Company, or the terms of such solution, remain in doubt, it is the opinion of your committee that not only the Metropolitan Company, but other responsible bidders, will hesitate to make proposals for the contract to construct and operate the rapid transit road which has been approved by your Board and by all the local authorities, and conditionally approved by the Court.

If, therefore, the Appellate Division shall enter an order approving the routes and plan of construction now proposed, this committee assumes that the Board will not, and respectfully recommends that the Board shall not, advertise for bids until the Board shall know the extent to which the Elevated Railway Company proposes to meet what the Appellate Division well calls the "imperious necessity of improved means of rapid transit." It will clearly be difficult while that form of solution of the problem is under serious but incomplete consideration by the Board or other local authorities, to make any proper contract for the construction of a railroad upon the routes and plan recently approved by the Court. In the opinion of the committee, therefore, the determination of the amount of the bond under section 34 ought, if possible, to await the result of the present suggestion of solving the rapid transit problem by additional facilities upon the existing elevated railroad system and by extensions of that system.

The Board has thus far proceeded upon the assumption that it had no power to compel the Elevated Railway Company or any other railroad company operating within the City to extend its lines or to give to the public facilities not required by its present charter. To make sure, however, the committee has asked the counsel of the Board for an opinion upon the subject. They have replied that the Board has no such coercive power whatever; that, so far as they have been able to ascertain, no authority of the city has any such power; and that it is extremely doubtful whether there be constitutional power by new legislation to compel an existing corporation against its will to

invest its funds in extension of its railway or to accept and use a new railroad franchise. The sole power of the Board under the present law, with respect to existing companies, is that provided by section 32, and is limited to action upon such applications as such companies may make of their own volition. They have the power to make such application when they please and subject to such terms and conditions as they please. The prerogative of the Board is to grant or to reject any such application. The Board may, however, invite an application, and, in the present situation, your committee is of opinion that an invitation should be extended.

A brief review of the proceedings of this Board will make clearer the views of the committee.

The Board was first constituted in 1891 to secure additional rapid transit facilities through private capital. The Elevated Railroad Company thereupon asked it for an extensive grant of street franchises. Your predecessors at once entertained the application, and were willing to grant a large part of the franchises asked, for an annual payment to the City, and upon an assurance that the company would within a reasonable time actually provide certain additional facilities. In view of the exclusive and enormously valuable character of the franchises then belonging to and used by the Elevated Railroad Company which had been freely granted to it in perpetuity, and in view of the certainty that the further exclusive franchises which the Board was willing to grant must be or become of great value (as it is now seen beyond a doubt that they would before this have become) the committee regrets that a reasonable annual payment and reasonable conditions should not then have been agreed upon. The Elevated Railroad Company declined further to press its applications or propose any solution of the problem until several years afterward, when the City had determined upon municipal construction, and this Board had begun to devise the present plan.

In November, 1894, the people of the City, having thus far failed to secure rapid transit with private capital, voted for municipal construction. The present Board came into existence; and on 9th May, 1895, proposed routes and plans of a rapid transit railroad. These plans received the approval of all the local authorities, and, after prolonged litigations, the unanimous approval of the Commission appointed by the Appellate Division of the Supreme Court. Those litigations involved the jurisdiction of the Court and the constitutionality of the Rapid Transit Act, on both of which questions the view of the Board was sustained by the Court of Appeals. In May,

1896, the Appellate Division refused to confirm the report of its Commissioners.

After the approval by the local authorities and before the action of the Appellate Division, the suggestion was officially made that the Board grant to the Elevated Railway Company certain additional facilities. This request was, on 29th October, 1895, incorporated in a resolution of the Board of Aldermen, which was officially transmitted to this Board. Thereupon this Board adopted and published a resolution declaring that, although it was heartily in favor of such action as would increase transit facilities, no application had been made to it by the Elevated Railway Company for additional privileges or franchises, and that, in the absence of such application, the Board was without authority to grant them. It was then generally understood that the Elevated Railway Company would make some application, but none was received from that company until 11th June, 1896 (about eight months later), when it presented a further application. At that time the Board was engaged upon another plan of municipal construction intended to meet the objections of the Appellate Division, but it suspended consideration of this subject in order to deal with the new application, in the hope that relief might be obtained from the Elevated Railway Company. Interviews were had between its officers and the Board. On 15th July, 1896, the company, in writing, presented a modified application. On 6th August, 1896, the President of this Board addressed its reply to the President of the Elevated Railway Company.

The application of the Elevated Railway Company was expressly conditioned upon its receiving immunity from claims for damages; it asked for grants of street surface franchises; it asked for franchises including 30 miles of new route besides additional facilities upon existing routes, but did not pledge the company to any actual extension of its system or other relief within any given period of time, and it made no offer of any rental. The answer of the Board pointed out that the application was not in a form which permitted definite acceptance; that the Board had no power under the law to assure to a private corporation building an elevated railroad immunity from damages; that under the statute rental must be paid on extensions; and that the Board was expressly forbidden by the statute to grant any right to construct a railroad on the surface of a street. It was further pointed out that the granting of any application not limited in time would be, in substance, to give an option to the Elevated Railway Company to extend or improve its system

whenever it should become ready to do so, without imposing upon it any corresponding obligation, thus suspending meantime the practical possibility of relief from any other quarter.

The Board concluded its communication by expressing the hope that the Elevated Railroad Company, in view of the exceptional privileges which it had received from the City, and the exceptional advantages which it then enjoyed for the extension of rapid transit facilities, would promptly amend its application so that the Board could lawfully deal with it; and the Board promised that, upon receiving such an application, it would reach a determination upon it without delay.

To this communication, made nearly eighteen months ago, no answer has been received.

The second plan of municipal rapid transit was proposed by the Board on 14th January, 1897. It was approved by the municipal authorities on and prior to 12th April, 1897. It was promptly presented to the property-owners. And on the earliest date possible in the conduct of business involving so much and such troublesome detail, it was presented to the Appellate Division, which, in July, 1897, appointed a second Supreme Court Commission. The Commission sat during August, September and October last, and in November unanimously approved the plan. Their report was promptly presented to the Appellate Division, which, on 17th December last, approved the routes and plan, but as a condition of entering an order to that effect required the stipulation as to security referred to in the resolution appointing this committee.

After the qualified approval of the Appellate Division and while this committee was examining the question of security, it was publicly and responsibly stated that the Elevated Railway Company was now ready to make a further application to the Board. Your committee is of the opinion that, in view of the inevitable practical result of the pending probability of such an application, the Board ought to request the Elevated Railway Company to make such application promptly. The Board will doubtless be ready now—as it has always been ready—to go as far, upon reasonable assurance of prompt action on the part of the company, as the interests of the City will permit, towards enabling the company to add such facilities and extensions as will relieve the needs of the City.

Meantime your committee recommends that the Board ask the Appellate Division to enter its order of approval without requiring a stipulation as to security, or if not, then to postpone the entry of



the order until the determination of the Elevated Railroad Company shall be known and the situation as to security shall be better apprehended. If, however, the Court shall require the stipulation and require it now, then the Board should ask that the amount of security be reduced to such an amount as while preventing irresponsible bids, shall not be prohibitive or prevent competition. Your committee recommends that the Board, by petition, respectfully and frankly submit to the Court the considerations bearing upon this subject which are hereinafter set forth. In the judgment of the committee, they may properly be addressed to the Court, even after the delivery of its opinion, for the reason that the question of the proposed stipulation or the amount of security which the Board should require was never submitted to the Court or dealt with or discussed by counsel on either side. Your committee believes, therefore, that the Court will not fail to entertain with open mind the considerations which the Board may present.

1. The opinion of the Court is to the effect that an order confirming the report of the Supreme Commissioners will be entered only upon the filing of a stipulation by this Board "that the penalty of the bond specified in section 34 of the Rapid Transit Act will be fixed at not less than fifteen millions of dollars."

The statutory provisions referred to, relative to the bond are as follows:

"The person, firm or corporation so contracting for the construction, equipment, maintenance and operation of said road, shall give a bond to said City, *in such amount as said Board of Rapid Transit Railroad Commissioners shall require*, and with sureties to be approved by the said Board, who shall justify in the aggregate in double the amount of said bond. Said bond shall be a continuing security, and shall provide for the prompt payment by said contracting person, firm or corporation, of the amount of annual rental specified in the aforesaid contract, and also for the faithful performance by said contracting person, firm or corporation, of all the conditions, covenants and requirements specified and provided for in said contract."

The statute under which the Board exists has thus devolved upon it the determination of certain business and administrative questions. Your committee suggests that the Board instruct its counsel to request the Court to consider whether the Board has any right by stipulation to bind itself or its successors as to the future exercise of its discretionary power as to the amount of security, and thus surren-

der a discretion vested in it for the public welfare. The powers of the Board are purely statutory; its members can act, not as individuals, but in their official capacity, the limits of their powers being strictly prescribed by law. What security ought to be required depends upon the conditions which shall exist at the time the contract shall be advertised. The statute leaves the determination of the amount of the bond as a matter of business discretion to the Board and to it alone. The understanding of this committee is that a public officer having a power like this may not rightly enter into a contract or stipulation as to its future exercise, except in the manner and at the time prescribed by law.

2. It is not possible for the Board, until it shall have power to propose a contract, to reach a definite conclusion as to what amount of bond ought to be exacted from the successful bidder under section 34 of the act. The terms of the contract are not yet fixed, and upon them much will depend. The length of the lease to be offered, the character of the requirements for operation, and the probable value of the equipment to be supplied by the contractor are all elements to be taken into consideration. The financial conditions likely to exist while the work is in progress, affecting the rate of interest payable on the City's bonds, will determine the minimum rental; and many other conditions must also be taken into account, none of which can be accurately known before the time when the contract is to be advertised.

3. If a bond for \$15,000,000 be required in the technical form prescribed by section 34, the requirement will, in the opinion of your committee, operate as a substantial prohibition of the enterprise.

\* \* \* \* \*

In the opinion of your committee, it was not the intention of the people of the City, or of the Legislature, that the Board should attempt the impossibility of eliminating all risk to the City in carrying out the rapid transit plan. Any future construction involving expenditure of money inevitably involves risk. Municipal construction was not justified, and could not, under the constitution, be justified for the purpose of making money. Its constitutional justification lay in the great public necessity of the City. No doubt the City ought to be exposed to as little risk as is practically compatible with accomplishing the purposes of the people in voting for municipal construction. But it is to be remembered that the rental to be paid is the full amount of the interest which the City is to pay upon its

bonds, and that, in addition, there is to be paid at least one per cent. per annum, with a conditional deduction for the first five or ten years. This minimum one per cent. is in effect a sinking fund, the result of which will ultimately be to give without expense to the City the rapid transit road completely constructed, the entire outlay, as well for principal as for interest, being met by the rental payable by the contractor.

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Your committee, therefore, suggests that the Court be requested to limit its requirement to a bond for construction and equipment, leaving it to the Board to fix the amount of the bond necessary to protect the City in regard to payment of rental and satisfactory operation of the road. Such a bond would have but a comparatively short time, perhaps four or five years, to run. If it were not required to be joint and several it could be given by sureties, each taking a portion of the liability. This bond would, of course, not be the bond required by section 34, which, under the statute, must be joint and several, and must run during the whole period of the lease. In addition to the bond thus required by the Court the Board would, of course, require another bond for a substantial amount strictly in accord with the statute.

\* \* \* \* \*

The conclusions of your committee may therefore be summarized as follows:

The public announcement of an intention on the part of the Elevated Railway Company to apply for additional facilities, or for extensions of its existing routes, operates to deter responsible bidders from undertaking the construction and operating of the rapid transit road laid out by this Board. No advertisement for bids should be begun until the Board is advised of the manner in which and the extent to which the Elevated Railway Company proposes to solve the rapid transit problem. In view of these facts, and of the fact that there are no means of compelling any corporation to accept or use a new franchise against its will, the Elevated Railway Company should be requested to submit promptly its application for such new powers as it may desire to use. Until action is had upon such application, the Supreme Court should be requested either to approve unconditionally the plans heretofore submitted, or to suspend action until all the facts are better apprehended.

If, however, the Court shall require a stipulation as to security now, the following considerations may be urged. In the first place, it may well be contended that this Board, as a public body, have no right to enter into any contract as to the future exercise of their powers. Even if the Board can with propriety give a stipulation as to their future action, the facts upon which to form a sound business judgment as to the amount of security to be exacted are as yet not fully known—particularly as the form of contract to be proposed to bidders cannot be settled in advance of the formal consent of the Court. In any case, a joint and several bond for \$15,000,000 running for the whole term of the lease, and on which the sureties must justify in \$30,000,000, is practically prohibitive, because satisfactory sureties could probably not be found. Even if found, the expense and difficulty of obtaining such security would operate to limit competition and tend to make the cost of construction larger than it need be, and without any compensating advantages. The City ought to be exposed to as little risk of loss as is compatible with accomplishing the purposes of the people in voting for municipal construction of a rapid transit road; but some risk is unavoidable. The attempt to exact too large a bond, continuing long after the road is finished, would only result in defeating the whole scheme of municipal construction and ownership. It is believed that such a result would be contrary to the intention of the Court and it would appear that the Court, in considering the amount of the bond to be given, had chiefly in mind the construction and equipment of the road. If the Court will consent to limit its requirement to security for construction—leaving it to the Board to fix the amount of the continuing bond—and will permit the giving of several bonds, such additional security for a very large amount could be obtained. But even for construction alone, a bond for fifty per cent. of the estimated cost of the work would be unnecessary—especially in view of the requirement of a cash deposit of \$1,000,000 and the proposed retention of a large percentage of the cost of the work until the road is fully constructed and equipped—and it is also contrary to the practice prevailing in all City or Government work.

As to the maximum amount of security that can be exacted, your committee, at this time, can only speak with the greatest reserve.

A cash deposit of \$1,000,000; a retention of not less than ten per cent. from the cost of the work until completion; several bonds to secure construction and equipment, amounting in all to not more than \$7,500,000, or 25 per cent. of the cost of construction; and a

continuing bond for such an amount as, with the City's lien on equipment, would be equal to seven years' rental; such seem to be the very highest terms now obtainable.

All of which is respectfully submitted.

A. E. ORR, CHAS. STEWART SMITH, G. L. RIVES,	}	<i>Committee.</i>
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Upon the presentation of the foregoing report a resolution was at once adopted by the Board (on January 17, 1898), instructing its Counsel to apply to the Appellate Division for a modification of the condition imposed by it, and inviting the Manhattan Railway Company to apply to the Board for such enlargement of its existing franchises as might be desired by that corporation.

The application to the Appellate Division for the modification of the terms imposed by it was granted somewhat later, to this extent, namely, that although the Court insisted that the Board must exact a bond of \$15,000,000, it consented that the liability of the sureties as to \$14,000,000 thereof should terminate when the railroad should have been constructed and equipped pursuant to the terms of the contract, and that the permanent liability upon the bond (that is, the liability for the due payment of the rent during the entire term of the lease) might be limited to \$1,000,000. (*Matter of Rapid Transit Railroad Commissioners*, 26 App. Div. 608). As thus modified, the condition imposed, although still severe and tending to restrict competition in a manner which the Board deemed disadvantageous to the City, was not necessarily prohibitory, and the Board accordingly entered into the stipulation required by the Court.

#### NEGOTIATIONS WITH THE MANHATTAN RAILWAY CO.

The invitation to the Manhattan Railway Company was followed (on February 3, 1898) by the filing of a formal application on the part of that Company, and, after numerous conferences with the representatives of that Company, the entire question was referred, for consideration, to a sub-committee of the Board, which, on

March 17, 1898, made a report, from which the following extracts are taken:

The Committee on Contract respectfully report that, pursuant to the resolution adopted by the Board on 3d February, it has conferred with Messrs. Gould, Sage, Galloway and Hartley, representing the Manhattan Railway Company, and has with the assistance of Mr. Parsons, the Chief Engineer, carefully and in detail considered the application of that Company dated 3d January, 1898.

The principal cause of delay has been the entire lack of precision in the application of the Manhattan Company, even as enlarged by their verbal discussions with us at our first conference. It became apparent that before there could be any proper considerations of the terms of a grant to them, it would be necessary to know with more accuracy what was to be granted. It was therefore agreed that the engineers of this Board and of the Manhattan Company should enquire into the problem from an engineering point of view. After this inquiry had been had and after many conferences between the engineers, Mr. Parsons, as long ago as the second of March, under our instructions submitted to the engineer of the Manhattan Railway Company a formal written statement of the extensions and improvements which he was prepared to recommend, and inviting criticisms thereon. After waiting a fortnight—a period which, in our opinion, was under the circumstances ample to enable the Manhattan Company to make its criticisms, and none having been received—we invited a conference. Such conference was held yesterday. At this conference we submitted to the Manhattan representatives a summary of the franchises hereinafter reported. These were in accordance with the communication of our Chief Engineer of the 2d instant. The representatives of the Manhattan Company stated that they considered our plan to be as good as could be suggested from an engineering point of view, but that they were quite unable to say whether they regarded it as within their financial ability to carry out. They had not had the details elaborated and had no estimates of cost. Nor were they able, although we had some weeks before asked them to give particular attention to the subject, to make any suggestions in regard to the rental to be paid the City for the additional use of the streets proposed. They asked still further time for investigation and consideration.

In our opinion, no useful purpose will be served by further delay on the part of this Committee or of the Board. The problem presses for solution, and the facts are perfectly well known. They

have been for years under the minute consideration both of this Board and of the Manhattan Company. The Board had long desired from the Manhattan Company an application which would enable the Board to act. When finally the Manhattan Company, on 31st January last (seven weeks ago), submitted such an application, we felt bound to assume that they had carefully considered their own ability to do the things which they asked leave to do and all other elements of the problem. Moreover, every day is adding to the difficulties of the situation. So long as the Manhattan application is pending, the consideration of other plans looking to a solution of the rapid transit problem is necessarily deferred. The preparation of the certificates, with their necessary detail, will occupy a little time. And during that time and before the final action of the Board, the Manhattan Company can properly have opportunity to make further suggestions.

A brief reference to the legal powers of the Board may be convenient. By section 32 of the Rapid Transit Act, the Board, upon application of any railway corporation operating within the City limits, may fix and determine the route or routes by which such corporation "may connect with other steam railways, or the stations thereof, or with steam ferries, or may extend its lines within said city; and may authorize any such railway company to lay an additional track or tracks . . . and to acquire terminal or other facilities necessary for the accommodation of the traveling public on any street or place, except the place now known as Battery Park, on which said railway may be located." This Board must also fix (1) the location of the railways and the new tracks and facilities; (2) the plans of construction; (3) the times within which they shall be respectively constructed; (4) the compensation to be made therefor to the city; (5) such other terms, conditions and requirements as to the Board shall appear just and proper. The amount of the annual license fee or rental must be readjusted at intervals of not more than thirty-five years. A certificate must be prepared by the Board setting forth in detail the action taken, which is to be delivered to the railway corporation making the application upon receipt of its written acceptance of the terms, conditions and requirements proposed. Such certificate, when accepted by the railway, operates as a grant of new franchise and constitutes a contract between the City and the railway corporation, enforceable by the Rapid Transit Board in the name of the City by suit for specific performance or otherwise.

We have accordingly prepared and herewith submit a statement showing in general what new routes, tracks, and facilities, should, in our judgment, be granted; and also the location, plans and construction, time of construction and compensation to the City, with such "other terms, conditions and requirements" as seem proper. It will be seen that we have advised granting in substance almost everything now applied for, but with modifications to secure the right of the City to speedy relief.

\* \* \* \* \*

In our opinion, the northerly extensions of the west side elevated systems will not materially increase existing rapid transit facilities unless they shall be preceded by a construction of additional tracks to the south of them. Such extensions would add local conveniences to the new territory reached at the north; but, as the existing elevated system has, for the busy hours of the day, in the morning and evening, reached its maximum carrying capacity along the lower portions of both the east and west side lines, the result of the northerly extensions would have little, if any, other effect than to enable the population at a greater distance to the north to enjoy rapid transit facilities, while probably excluding from these facilities a corresponding population at the south. In our opinion, therefore, the Manhattan Company will not find it to be to its pecuniary interest to construct such extensions until it shall have provided the additional facilities to carry the increased traffic downtown. The Company would otherwise accomplish no more than to carry substantially the same number of passengers at a materially greater cost. For these reasons we propose that the franchise for extension shall not be dependent upon the acceptance by the company of the franchises for additional facilities.

We cannot too strongly emphasize our conviction that any radical improvement of the existing transit situation of the Manhattan Company depends absolutely upon their providing additional facilities on the southern portion of the existing elevated railroad system. Of these the most urgent is the improvement of the Third Avenue road. We propose the remodeling of the City Hall station, the building of four tracks from the City Hall to Fifth Street (near Cooper Union), the completion of the third track (already laid part of the way), from Fifth Street to the Harlem River, and very improved terminals at the Harlem River. The adoption of these suggestions would permit the running of numerous express trains, thus relieving overcrowding and greatly shortening the time to One Hundred



and Twenty-ninth Street. A far more effective method of relief would be to build a four track road all the way to the Harlem River, which would nearly double the carrying capacity of the present structure; and this we should have recommended if we had had the slightest reason to believe it would be accepted by the Manhattan Company.

\* \* \* \* \*

If the Manhattan Company shall accept the seven franchises thus proposed and carry them out according to their terms, the rapid transit facilities of the city will be materially improved. The rapid transit problem, however, will not be solved. On the contrary, it is our belief that before the periods described in the franchises shall have expired, the necessity will be even clearer than it is now for an additional rapid transit system having the enormous advantages incidental to a system carried through tunnels constructed in the improved modern method. This will, in our opinion, be the case, notwithstanding the increase of the capacity and traffic of the Manhattan system. If the Manhattan Company shall exercise all the franchises now proposed to be tendered it, it will be able to carry a very much larger number of passengers and to carry the passengers at a materially increased rate of speed. And as our proposition is that the Manhattan Company shall be permitted to take any or more or all of the franchises, the company is enabled, if it does not see its way to undertake all of these obligations, still to undertake such of them as shall give material relief. If the Manhattan Company shall, pursuant to the statute, accept all the certificates tendered by the Rapid Transit Board, the City and the public will have assurance of a reasonably prompt and material improvement of its transit facilities.

A. E. ORR.

JNO. H. STARIN.

G. L. RIVES.

The foregoing report was approved by the Board on March 17, and seven "franchises" were prepared, conformably to its recommendations, which were formally tendered to the Manhattan Railway Company pursuant to a formal resolution to that effect adopted by the Board on April 7, 1898. These franchises were not, however, accepted by that corporation.

Prior to this time the Board had had conferences with persons of influence in railroad transportation within New York in the hope of interesting them in the rapid transit construction. Such interviews were had with the late Cornelius Vanderbilt, with Chauncey M. Depew, President of the New York Central & Hudson River Railroad Company, and with the late Charles P. Clark, President of the New York, New Haven & Hartford Railroad Company. The Board presented to those gentlemen the advantages which it then believed belonged to the rapid transit plan, and which experience has since demonstrated did in fact so belong, and urged the value of co-operation with the Board. The Board was, however, unable to convince them. Later, like conferences were had with William C. Whitney and others representing the Metropolitan Street Railway interest, and also with other capitalists representing other large railroad interests. But until the actual letting of the rapid transit contract in January, 1900, the Board was unable to satisfy any responsible person in control of railroad interests within the City of New York that they could undertake the rapid transit contract with any fair chance of profit.

#### APPEAL TO THE LEGISLATURE.

On July 1, 1897, the important and responsible duty of preparing the contract for the construction and operation of the proposed railroad had been committed to a sub-committee of the Board, which had, from time to time, reported the progress of its work, and whose reports had formed the topic of the most careful investigation and consideration. This contract was finally completed to the satisfaction of the Board, on March 31, 1898, and, in view of the requirement of the statute that its form must be approved by the Corporation Counsel, it was forwarded to that officer on April 7, 1898, with the request that he would speedily examine it. No attention was, however, paid to this request until the month of September, 1899, and in the meantime all work on the part of the Board looking to the construction of the railroad was brought thereby to a standstill.

The situation, as it existed in the beginning of the year 1899, and the various expedients which had been considered by the Board as affording possible methods of bringing its labors to a successful conclusion, were most fully explained in a memorial addressed by the Board to the Legislature, in which, after referring to the earlier proceedings of the Board, and to the fact that the Corporation Counsel had omitted to take action upon the form of the contract, the Board said:

"By the terms of that statute, (the Greater New York Charter), which took effect on the 1st of January, 1898, the new and enlarged city was compelled to assume all the debts of the counties, cities, towns, villages, school districts and other public corporations within its limits. The total amount of this indebtedness was not then known, and could only be ascertained by means of laborious inquiry from the records of the ninety-five different bodies which had theretofore possessed authority to incur debt. Nor can the amount even now be stated with entire precision. In the first place, the validity of some apparent liabilities is in dispute. In the second place, the exact proportion of the debts of the public corporations which were only partly annexed by the Charter, such as the County of Queens and the Town of Hempstead, has not yet been determined by the Supreme Court. In the third place, while the city is unquestionably liable for certain lands taken for park and other purposes where the title has, by operation of law, rested in the City and the buildings thereon have been demolished in order to make way for their improvement for public use, nevertheless, in view of the fact that the reports of the Commissioners appointed by the Courts to assess damages for their taking have not been made, it is possible only to estimate what the City's indebtedness in such cases may be.

It is, however, the opinion of the Comptroller of The City of New York that on the 1st of January, 1898, the new City of New York was burdened—under its Charter—with a debt which was not less than thirteen and a half million dollars in excess of ten per cent. of the assessed value of the real estate within the City limits.

Obviously such a condition of affairs rendered it impossible during the past year to borrow the money required to construct the municipal railway as contemplated by the Act of Sale of 1894, and the Board of Rapid Transit Railroad Commissioners have been compelled to consider attentively what courses are now open to the

City of New York to obtain the relief so long and so urgently needed.

Three courses suggest themselves:

1. To wait until the borrowing capacity of the City is so enlarged by a reduction of its present debt or by an increase of assessed valuations of real estate, or by both, as to enable it to borrow the necessary funds.

2. To obtain legislative authority to issue bonds of the County of New York for the construction of the proposed railway.

3. To obtain legislative authority to offer the franchise for building and operating the proposed railway to private enterprise.

#### I. CONSTRUCTION BY ISSUE OF CITY BONDS.

If the existing statutes are permitted to remain in force, unamended, the only means of obtaining adequate and permanent relief lies in the enlargement of the City's capacity to incur debt.

The last assessed valuation of real estate in The City of New York, as stated by the Department of Taxes and Assessments, was \$2,528,533,441.

The net funded debt of The City of New York on  
January 1, 1899, as recorded on the books of  
the Department of Finance was..... \$244,212,835.97

There are also:

Bonds which have been approved as to legality, but which have not been presented for registration.	268,049.50
Bonds not approved as to legality.....	2,418,406.18
Proportion of the debt of Queens County claimed in a suit now pending, to be part of the debt of The City of New York.....	3,862,116.79
Proportion of the debt of the Town of Hempstead (\$470,000) claimed in a suit now pending, to be part of the debt of the City of New York..	167,550.26
Total.....	<u>\$250,928,950.10</u>

The amount is only \$1,924,394 less than ten per cent. of the assessed valuation of real estate in The City of New York. The fact

that the net funded debt of the City is so nearly equal to the limitation imposed by the Constitution on the extent to which Cities "shall be allowed to become indebted for any purpose or in any manner," renders it unnecessary to discuss the question as to whether, and, if so, to what extent, the remaining liabilities of the City, such as liability for contracts (for which no provision has been made by the sale of bonds), judgments, and liabilities for lands taken in condemnation proceedings constitute indebtedness within the purview of the constitutional inhibition. Not only are the figures relating to these questions necessarily uncertain for the reasons given above, but any attempt at a statement therefor would involve a prior determination of difficult questions of law, some of which have never been presented to the courts of this State for adjudication.

On January 9, 1899, however, the Tax Commissioners made public the assessed valuations of real estate for purposes of taxation during the year 1899. These new valuations show an increase of \$421,512,876, ten per cent. of which, or \$42,151,287.60, represents the amount by which the City's debt-incurring capacity could be thereby increased. These new valuations are still subject to modification, but it is not likely that the aggregate thereof will be materially changed before their final confirmation which will occur on the first Monday in July. In view of the fact that under the most favorable circumstances the City would not be called upon to issue bonds for rapid transit purposes before July, 1899, the changed financial conditions which these new assessments will create may be regarded, for the purposes of this discussion, as presently existing.

This statement, however, does not convey the whole truth of the situation.

On the one hand, the undersigned recognize the fact that, however important the solution of the rapid transit problem may be to the citizens of New York, and especially to the inhabitants of Manhattan and the Bronx, there exist other claims for public improvements throughout the whole City which cannot properly be slighted or delayed. The necessity for new school buildings is urgent. The two eastern Boroughs of Brooklyn and Queens demand the construction of new bridges over the East River to the Borough of Manhattan. The improvement of the water front for dock purposes should continue without interruption, and the financial requirements of the water-supply system may be regarded as a constant source of proper and necessary expenditure.

On the other hand, the enormous revenues of the sinking funds, tending constantly towards redemption of the City's bonded obligations, enable the City to issue bonds to the amount of about twelve millions of dollars annually without any resulting increase in the net funded debt. In the former City of New York these revenues for many years were sufficient during periods of normal financial activity to offset new issues of bonds, so that the net debt remained practically stationary. Thus, during the five years from January 1, 1890, to January 1, 1895, the net funded debt increased only \$7,877,935.45, although the new issues of bonds during this period aggregated \$52,088,768.44; while during the ten preceding years, from 1880 to 1890, the net funded debt actually decreased \$7,284,562.60, although the new issues during that period aggregated \$59,226,838.

The annual cash revenues of the several Sinking Funds of the City of New York as now constituted amount to between twelve and thirteen millions of dollars.

This practically represents the amount of new bonds which the City can issue annually without increasing its net bonded debt.

To what extent, if at all, will it be necessary for the City to exceed this amount in its annual bond issues in order to provide for necessary public improvements other than the construction of the rapid transit road?

A hypothetical question of this character is not, of course, susceptible of an exact answer, since opinions might fairly differ as to the relative necessity of certain public improvements. Assuming, however, that during the next three years the bonds issued for school houses, bridges, docks, repaving streets, for the water supply, and for miscellaneous purposes, should not exceed the amount of the sinking fund revenues—i.e., \$12,000,000 per annum—it would be possible to provide for additional issues to an amount equal to the estimated cost of the rapid transit road.

The Comptroller is of the opinion that if it should be found both practicable and expedient to construct this road by the use of the municipal credit the contract or contracts for its construction should be so drawn as not to obligate the City to an issue of bonds exceeding ten millions of dollars in any one year, and the Commission is advised that this condition can be provided for without difficulty.

If, for example, the road could be built in three years and the contract be let in sections, costing, say, \$10,000,000 each, the contractor being bound to build the entire line when called upon to do so, and the City having the option of stopping or going on with the

work as each section was completed, then the addition to the City's debt would only be \$10,000,000 a year, or considerably less than the amount represented by the annual proceeds of the sinking funds available for the redemption of the City debt.

The uncertainties of this situation are, however, such that the Board of Rapid Transit Railroad Commissioners feel they would be derelict in their duty if they were to rely solely on this possible solution. They are clearly of the opinion that it is their duty to ask for some enlargement of their powers, so as to enable them either to take advantage of the improvement in the City's finances, or else, if and when it is desirable to do so, to look to other sources for the capital needed to build a satisfactory and efficient railway.

## II. CONSTRUCTION BY ISSUE OF COUNTY BONDS.

A prompt method of obtaining the use of the public credit for the construction of a rapid transit railway would be to provide that such railway, when built, should be an asset exclusively of the County of New York (that is, of the Boroughs of Manhattan and The Bronx), and that the funds should be raised by issuing bonds of that County.

The Rapid Transit Board is advised that legislation authorizing such an issue of bonds would not be obnoxious to any existing provisions of the Constitution, and that the debt of the County is far below ten per cent. of the assessed valuation of its real value.

The proposition to issue County Bonds has been supported upon the ground that it maintains in its integrity the essential portion of the Act of 1894, namely, a scheme of municipal ownership and private operation. The proposition, if adopted, would effect no change, except in declaring that the railroad should be an asset of the County of New York only, and that the funds for building should be raised by the issue of the bonds of that County. As already explained, the obligation thus assumed by the County would be purely technical, and would not involve the levying of any tax or the imposing of any burden upon the taxpayers of the County, except in the event of a default on the part of the contractor who builds the railroad; because such contractor would be bound to agree to lease the road for a term of years at a rental sufficient to pay not only the interest on the bonds issued by the County, but also to create a sinking fund for payment of the bonds themselves. Moreover, no obligation could be incurred by the County until a corporation was

found willing to enter into this contract and to furnish such indemnity as would abundantly insure the County against any possible default.

The Comptroller of the City of New York, however, is strongly of the opinion that the issue of the County Bonds is undesirable in any event, and his action in signing this memorial is not to be construed as committing him in any sense to the arguments hereinbefore contained which are favorable to the issue of such bonds.

### III. CONSTRUCTION BY PRIVATE CAPITAL.

The third solution lies in the possibility of selling a franchise to construct and operate the rapid transit railroad, if the statute permitted such a franchise to be offered for sale. The financial conditions are now much more favorable to the successful conduct of such an enterprise than they have been at any time heretofore. Moreover, the testimony taken before the two Supreme Court Commissions, to which reference has been above made, and the striking success of the subway in Boston have removed doubts which formerly existed in some quarters, both as to the practicability of such a road and as to the possibility of calculating the cost.

The adoption of a plan for private ownership of a new rapid transit road would, undoubtedly, involve a complete reversal of the policy deliberately adopted little more than five years ago by a practically unanimous vote of the Legislature, and by an overwhelming majority of the voters of the former City of New York, and this ought not to be permitted except under the pressure of the most cogent reasons.

Moreover, in a work of this magnitude, involving the employment of vast capital, requiring several years to complete, and subjecting the persons who undertake it to some risks of a serious kind, it might be necessary to offer a perpetual franchise. The present City Charter provides (sec. 73) that:

"After the approval of this act no franchise or right to use the streets, avenues, parkways or highways of the city shall be granted by the municipal assembly to any person or corporation for a longer period than twenty-five years, but such grant may, at the option of the city, provide for giving to the grantee the right, on a fair revaluation or revaluations, to renewals not exceeding in the aggregate, twenty-five years."

Here again the attempt to secure construction of a rapid transit railway by private capital might involve a departure from a cherished



principle, adopted upon great consideration. The cities of this State have, in the past, granted franchises for the use of the public streets upon terms which, although apparently adequate at the time of the grants, turned out ultimately to be quite illusory. In The City of New York in particular, such franchises as those for the construction of the elevated railways and for the surface lines on Third and Sixth avenues and Broadway have proved the sources of enormous private gains without corresponding returns to the City. It was, therefore, the purpose of the framers of the new Charter to prohibit utterly the granting of perpetual franchises.

Quite apart from and in addition to the considerations just mentioned, is the further consideration that the contemplated rapid transit road, whether built with City money or by private capital, will, at the end of a comparatively short time, become a piece of property whose value it would be difficult to overestimate. It is perfectly safe to say that in the course of fifty years the certain growth of the city's population will so increase the earning capacity of such a road that the value will be far greater than its original cost. The effect of permitting construction by private capital would, therefore, be to surrender to individuals an asset which might be made a valuable addition to the property of the people of the whole city. The former City of New York, in its ownership of markets and docks, exemplifies the wisdom of pursuing the plan of municipal ownership. In the surrender of its streets to surface and elevated roads, which are now doing a profitable business on a capitalization far greater than their original cost, it exhibits the results of the opposite course of dealing.

The Rapid Transit Board is, however, of the opinion that the proposed underground railway is a work of such peculiar character and of such exceptional value to the City, that a departure from the settled policy of recent legislation might be justified.

It is plain that such justification can only be found in the event of the public credit proving unavailable. That such will be the case is not as yet entirely certain, for the reasons above pointed out. The Board, therefore, recommend that if power is granted them to sell the franchise to construct the road such power shall be additional to their present powers and not a substitute for them. In this way the Board will be enabled to take advantage of varying conditions, as they may arise in the future. If the City authorities shall see their way to keep the debt sufficiently within the constitutional limitation, then the Board will be in a position to authorize munic-

ipal construction; and, on the other hand, if municipal construction shall prove to be constitutionally impracticable within any reasonable time, the Board may be enabled to arrange for construction by private capital.

The Board, therefore, ventures to urge that if the Legislature shall determine that it is wise to permit a resort to private capital the largest measure of authority and discretion compatible with the public interest shall be intrusted to the Board in order that it may frame such a franchise as will certainly attract sufficient private capital and arouse competition. And the Board deems it of especial importance, if private enterprise is to be enlisted, that the Board may be authorized, in its discretion, to enter into such a contract with the corporation that shall undertake the work as will exempt it from taxation for some limited period, and will insure it for a period of years at least against the possibility of legislative or municipal interference."

#### PROPOSALS OF THE METROPOLITAN STREET RAILWAY CO.

Almost immediately after the presentation of this memorial to the Legislature, and before action had been taken upon the bill which had been introduced by the Board for the purpose of obtaining the desired powers, a proposition was received from gentlemen closely identified with the Metropolitan Street Railway Company, and who were avowedly acting in its behalf, to the effect that, if the Board would grant a perpetual franchise to a new corporation to be formed by them, they would construct a railroad upon the route and according to the general plans adopted by the Board, and would agree to construct the west-side branch to a point north of Fort George within three years, and the remainder of the proposed railroad within two years after the corporation should earn five per cent. upon the actual cost of constructing the first section. They offered, in case such a franchise should be granted to them, to pay therefor the annual sum of five per cent. of the gross receipts, "provided that the grantee shall first receive five per cent. net upon the cost of construction."

The Board was then, as it always has been, unanimous in the belief that the benefit of owning the railroad should be preserved to the City, if it were possible to obtain rapid transit while still

preserving such ownership. But, on the other hand, the necessities of the situation imperatively required that the construction of a rapid transit railroad should be obtained in some way, and the Board believed that if, for any reason, it could not be obtained under such a plan as would reserve the ownership to the City, it might perhaps be better to commit the work to a private corporation than that there should be no rapid transit at all. It was also the belief of the Board that, if it could present as an alternative to the plan of municipal construction another plan which offered an immediate solution of the difficulty through the medium of a perpetual grant to a private corporation, a clear-cut issue would be presented to the public, and that this would compel the City authorities to come to a decision upon the vital question whether the railroad should be constructed with the City's money and be the City's property, or whether it should be constructed by and belong to a private corporation. The Board hoped that, if it became necessary to embrace the alternative of private ownership, it could obtain from the Metropolitan Street Railway Company much more favorable terms than those expressed in its first proposition.

These considerations induced the unanimous adoption by the Board (on March 29, 1899) of a resolution, proposed by Mayor Van Wyck, to the effect that it was the sense of the Board "that it is in the public interest that in addition to the powers already possessed by the Board, the Legislature should grant to the Board the power to contract for the construction and operation of the Rapid Transit Railroad by private capital."

The introduction of a bill to confer the power of making a perpetual grant of the franchise to a private corporation, in addition to the powers already possessed by the Board, served, however, to show the strength of the popular sentiment in favor of reserving the ownership of the railroad by the City. Immediately upon the publication of the terms of the proposed bill, it became manifest that the press, and a large majority of the public, were unalterably opposed to the grant of a perpetual franchise to the Metropolitan Street Railroad Company, or to any other private corporation.

But although this agitation ultimately accomplished the defeat of legislation which, by creating a perfectly plain alternative,

might have brought the project of municipal construction appreciably nearer to accomplishment, it was unquestionably of great service as constituting an impressive demonstration of the strength of public sentiment which could be arrayed in support of the plans already formed by it. The first and most tangible result, however, of this demonstration of public sentiment, was to lead the gentlemen who had advanced the proposition to withdraw it. In a letter, dated April 17, 1899, they stated, among other things, that the opposition which had developed had created such a situation that "success in the enterprise would be impossible."

#### CITY AUTHORITIES URGED TO TAKE ACTION.

In May, 1899, Mr. Morris K. Jesup was elected as President of the Chamber of Commerce, and thus succeeded Mr. Alexander E. Orr as an *ex-officio* member of the Board. But at the first meeting of the Board held thereafter (on May 11), Mr. John Claflin resigned as a member of the Board, and Mr. Orr was immediately re-elected as his successor. At the same meeting Mr. Lewis L. Delafield, who had theretofore served as Secretary of the Board, resigned, and shortly thereafter (on June 1) Mr. Bion L. Burrows was elected as his successor. Mr. Starin, the Vice-President of the Board, acted as its President from May 11 to May 23, 1899, when, upon his motion, Mr. Orr was again elected as President. Since that date there has been no change in the constitution of the Board.

At the meeting held on May 11, 1899, the counsel of the Board reported that the Mayor had that day declined to accept in behalf of the City the amendments to the Rapid Transit Statutes recently passed by the Legislature. This was the bill introduced by the Commission which had been so changed as to hamper seriously any negotiations which the Board might have determined to undertake with a view to construction of the railroad by private capital. The Legislature by this time had adjourned, and in view of the failure of any legislation, the Board deemed it proper to prepare and make public a statement showing the situation of the Rapid Transit problem.

On the 19th of May, the following communication was accordingly addressed to the Mayor:

OFFICE OF THE SECRETARY OF THE  
BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS,  
No. 111 BROADWAY, NEW YORK, May 19, 1899.

*To the Honorable ROBERT A. VAN WYCK, Mayor:*

*Sir:*—The Board of Rapid Transit Railroad Commissioners of The City of New York respectfully begs to submit this inquiry concerning the extent to which the municipal authorities will feel able to promote construction by the City of the proposed rapid transit road. Its routes extend from the City Hall and Brooklyn Bridge northerly along Centre and Elm Streets and Fourth Avenue to Forty-second Street, thence under Forty-second Street to Broadway, thence under Broadway to One Hundred and Fourth Street, the routes there dividing, one continuing to and along the east side to Bronx Park, and the other continuing under Broadway to Kingsbridge.

These routes and the plan of construction of the railroad were prescribed by this Board on February 4, 1897. They were approved by the Mayor and Common Council on March 25, 1897; by the Park Department on April 12, 1897, and by the Commissioner for the Twenty-third and Twenty-fourth Wards on April 19, 1897. Later, and after prolonged litigation, they were approved by the Appellate Division by its order made on April 6, 1898. The routes and plans have, apart from such official and judicial adoption, received general and practically unanimous approval. In the proposal recently made by the Metropolitan Street Railway Company they were adopted almost in their entirety as practically the best routes and plan which, in the judgment of that company, were available, even if construction were to be by private capital.

The Board, without any delay after securing the necessary approvals, prepared the form of contract for construction and leasing of the road in conformity with the rapid transit statute, the vote of the people and the provisions of the order of the Appellate Division. Pursuant to section 13 of the Act of 1894, this form was submitted to the Corporation Counsel on April 7, 1898, for his approval as to form; but no communication has as yet been received from him, whether of approval or disapproval.

Early in the present year the Board submitted to the Legislature a bill designed to give the Board the power, if municipal construction should not be practicable, to resort to private capital. This bill was, however, materially and even seriously amended; and in its amended form it has not been accepted by the City. The result is that the rapid transit road must be built by the City if it is to be built at all.

\* \* \* \* \*

The present rapid transit law, although in some respects susceptible of improvement, is nevertheless entirely adequate for municipal construction, provided the municipal authorities will co-operate with the Board. In prescribing the routes and plan, in procuring the necessary official and judicial approvals, and in preparing the proposed contract for the construction and operation of the road, the Board has done all within its power. It cannot move further until the Corporation Counsel shall give his approval to the form of the proposed contract for construction, or shall advise the Board in what respect the contract should be amended in order that it may secure his approval.

The contract was drafted after the consolidation of the present City had gone into effect, and this Board had clearly before it the possible difficulty incidental to the limits to which the City's debt-incurring capacity was then subject. The proposed rapid transit contract was drawn by the Board, therefore, so as to enable the City to avail itself of the provisions of the act permitting construction of the road in sections and to delay, whenever necessary, any stage of construction until the financial situation of the City should afford the requisite credit. The effort, on the one hand, was to preclude the possibility that the City could incur a debt beyond the constitutional limit; on the other hand, the Board sought by the form of contract to make the delay the very least necessary, so that just as soon as the debt-incurring capacity should be sufficient, actual construction might proceed. The Board deemed the removal of every source of delay to be clearly necessary in view of the popular vote and of the dominating necessity for rapid transit.

The Board is advised that the provisions so inserted in the contract to meet the debt limit question are sufficient, but if in the opinion of the Corporation Counsel they are not sufficient, the Board desires to be so advised, that the contract may be forthwith amended. Or if, for any reason, the contract ought not to be made until the

new assessment of realty in the City is confirmed, the Board respectfully begs that it may be so informed. The Board could thus at least be ready for immediate action at the first moment the new assessment provides adequate debt-incurring capacity.

That assessment, if confirmed, will add upwards of \$42,000,000 to the City's debt-incurring capacity, an amount much more than enough to build the rapid transit road, nor will the use of the City's credit for municipal construction of this road prevent the City from borrowing money for other urgent purposes.

\* \* \* \* \*

It is hoped that the constitutional amendment to be voted on by the people next November will still further reduce the existing City debt, so as to make the debt limit no longer an obstruction to rapid transit or to any other municipal improvement. But whether that amendment shall be adopted or not, and whatever may be its effect if adopted, it seems to be clear, upon the information communicated to us by the Comptroller, that the new assessment, with the large annual income, now \$12,000,000 or \$13,000,000, from sinking funds, will enable the City to construct the rapid transit road without interfering with any other necessary improvement.

\* \* \* \* \*

The Board begs to repeat that its power to carry out the purpose for which it was created now depends practically, first, upon the permission of the Corporation Counsel to make any contract, and, second, upon the assent of the Board of Estimate to a postponement of the making of other contracts involving large municipal debt until a rapid transit contract actually made shall assure the carrying out of that great public measure. The Board, therefore, respectfully asks your Honor, and through you the other municipal authorities, whether in these two respects it may be aided to secure prompt and actual construction of the rapid transit road by the City.

The amendment to the Constitution referred to in the foregoing letter provided in substance that the debts of the separate counties which were embraced within the Greater City of New York should not be counted in determining the limitation of the debt-incurring capacity of the City. These debts amounted to about \$30,000,000. The amendment, it may be here noted, was, in fact, adopted at the election held in November, 1899.

No reply having been received from the Mayor or any action taken either by the Board of Estimate and Apportionment or the Corporation Counsel in regard to Rapid Transit matters, a further communication was addressed by the Rapid Transit Board to the Board of Estimate and Apportionment on July 13, 1899, in which the subject was again gone over. The attention of the Board of Estimate and Apportionment was called to the fact that the debt-incurring capacity of the City appeared to be not less than \$40,000,000, a sum amply sufficient to build the Rapid Transit Railroad; that no contract could be made until the Corporation Counsel acted; that the Rapid Transit debt of the City could not be technically created until after a contract had been executed; and that until such debt was created or authorized other debts might be incurred which would effectually prevent the construction of the road and thus defeat the will of the City as represented by vote of its people. The Rapid Transit Board, therefore, requested that no other debt should be authorized by the City to an amount sufficient to reduce the debt limit below the cost of the Rapid Transit road until there should have been reasonable opportunity for the letting of the contract. To this communication no answer was returned.

DRAFT CONTRACT APPROVED BY CITY AUTHORITIES.

On September 20, 1899, the Corporation Counsel addressed a letter to the Commission, in which he stated that he had withheld his approval from the draft contract submitted to him in April, 1898, "for the reason that, while the approval of the Corporation Counsel was technically merely an approval as to form, it has always been the practice of this Department in such a case not to approve as to form a contract which could not legally be made." The Corporation Counsel further stated that the City was now in a position to undertake the work and that he had recently conferred with one of the members of the Commission and one of its counsel with a view to expediting the business. He criticised the form of contract upon the following grounds:

1. That the City itself, acting through its Law Department, should have sole charge of all proceedings for the condemnation of lands.



2. That the contract ought to provide for the transportation of "light parcels and packages."

3. That the road should provide the space necessary for the installation of electric wires for lighting and telephone purposes, and to some extent for "gas and sewer pipes."

4. That the City should be represented upon the work by a supervising engineer, to be selected by the Board of Estimate and Apportionment.

5. That the work of construction should begin at the upper rather than at the lower end of the island, as this would benefit the value of property in the upper part of the City.

6. That the terminus of the road should be at the Battery instead of the City Hall.

7. That the specifications should be carefully examined and that any obscurity which might be found therein should be made clear.

8. That the provision of the contract regarding compliance with all laws relative to the undertaking should be amended by reference specially to the provisions of the labor law as amended by Laws 1899, Chapter 567.

On September 22, 1899, the Commission addressed a reply to the Corporation Counsel dealing with the various points as follows:

In reply to the suggestion that the contract should provide for giving to the Law Department of the City the charge of proceedings for condemnation of lands, it was stated that the law expressly provided that the Corporation Counsel should have charge of such proceedings.

With regard to the provision "for the transportation of light parcels and packages," it was pointed out that the Rapid Transit Act authorized the use of the railroad for that purpose.

With regard to the suggestion for a provision of space for electric wires, gas and sewer pipes, the answer was that the Rapid Transit Board had no authority to build anything but a railroad; that in the first plan of the Board the Board had proposed a subway for pipes and wires along Broadway, such an arrangement

being necessary because of the limited space along that street; and that that plan had been rejected by the Supreme Court.

As to a supervising engineer to be appointed by the City authorities, the Board stated as its opinion that it could not "legally or with any due regard of its own control of the work delegate to any engineer except its own any function of authoritative supervision."

As to beginning construction at the upper end of the island, the opinion was expressed that there were serious objections to such course.

As to changing the southern terminus of the road from the City Hall to the Battery, the answer was that this could not be done without the adoption of a new general plan and new applications to the municipal authorities, to the property-owners and to the Appellate Division; all of which would most seriously delay the commencement of construction.

The suggestion that the specifications should be examined with a view to removal of obscurities was answered by reference to the fact that the specifications had already been scrutinized by Mr. George S. Morison, past President of the American Society of Civil Engineers, and Howard A. Carson, Chief Engineer of the Boston Subway, but that the Board would welcome any specific suggestion of obscurity.

In reference to the Labor Law, the Board stated it would insert the provisions required by the Act of 1899, which, when the contract was drafted, had not been passed.

On October 6, 1899, a revised draft of the contract was sent to the Corporation Counsel, containing certain important modifications. Of these the most important was a provision intended to put beyond the possibility of doubt the power of the City to make the contract without embarrassment to other needed improvements. The revised draft, therefore, provided that the City should undertake at the outset an absolute obligation only for the construction of so much of the road as extended from the Brooklyn Bridge to Fifty-ninth Street, and an option on the part of the City to require the contractor to complete the remainder of the work within certain periods therein provided.

After some conferences with the Corporation Counsel the form of contract, as amended, was approved by him on October 11, 1899.

AMOUNT OF SECURITY REDUCED BY THE COURT.

The subject of the reduction of the amount of the bond for Fourteen million dollars, required by the Appellate Division, was also made the subject of conferences with the Corporation Counsel, and a joint application was made by him and by the Counsel of the Board to the Appellate Division on October 20, 1899. This application was argued before the Court on October 30, and a favorable decision was rendered on November 10, the presiding justice dissenting. The majority of the Court, in deciding the application, said:

"The Corporation Counsel, on behalf of the City of New York, having joined with the Rapid Transit Commissioners in this application, and the Municipal authorities as well as the Rapid Transit Commissioners having represented that in their opinion a bond of Five million dollars will, in view of the form of the contract and the conditions under which the Rapid Transit Road is now to be constructed amply protect the City, the Rapid Transit Commissioners are relieved from the stipulation which they gave as a condition upon the confirmation of the report of the Commissioners in approving of the construction of this proposed railway to the extent that a bond of Five million dollars will be a compliance with the stipulation."

*(Matter of Rapid Transit Commissioners, 44 App. Div. 636.)*

CONTRACT AWARDED.

The legal and technical difficulties having thus been at last surmounted, an invitation to contractors was prepared and ordered published in six newspapers twice a week for three successive weeks, and the date of opening bids was fixed for the 15th of January, 1900. Upon that day the Commission received two bids in the form prescribed by the Board, one from John B. McDonald and one from Andrew Onderdonk. Mr. McDonald's bid offered to construct the entire road for \$35,000,000. Mr. Onderdonk

offered to construct the road for \$39,300,000, and he further proposed that, in case the gross receipts exceeded Five million dollars in any one year, to pay, in addition to the rent fixed by statute, five per cent. on the first million dollars in excess and two and one-half per cent. on each additional million up to a maximum of fifteen per cent. Each of these bids was accompanied by a deposit of \$150,000.

It will be observed that while Mr. McDonald's bid offered to construct the road for a smaller sum of money, Mr. Onderdonk's bid provided for a larger rental in certain contingencies, so that it became necessary for the Board to give careful consideration to the question which of these two bids was really the most desirable in the interest of the City. A committee was accordingly appointed to examine the bids and also to consider the value of the securities which the bidders offered to deposit and the responsibility of their proposed sureties. On the following day, January 16, 1900, the committee, by the Comptroller, one of its members, reported that they had considered the two bids and recommended the approval of that submitted by John B. McDonald.

A question was, however, raised by the Comptroller as to whether, under the charter of the Greater New York (which had been passed since the amendments to the Rapid Transit Act), bonds of the City issued to pay for the construction of the road would have to be authorized by vote of the Municipal Council? Also whether the provisions of the charter requiring every contract with the City to be endorsed by the Comptroller with a certificate to the effect that funds had been provided was necessary to the validity of a contract executed under the Rapid Transit Act? In order to set these doubts at rest a bill was introduced in the Legislature declaring that the consent or approval of the Municipal Assembly should not be necessary to authorize the issue of bonds for the Rapid Transit work; that the Rapid Transit Board might request the Board of Estimate and Apportionment to authorize bonds for the full amount of the estimated expense of executing the contract; that in case the Board of Estimate and Apportionment should authorize such an issue, the Comptroller might thereupon endorse the contract with his certificate that funds were available for the entire contract; and that no certificate in the

form required by the charter of the Greater New York should be necessary to make the contract binding upon the City of New York. Immediately upon the introduction of this bill, Governor Roosevelt sent in an emergency message to the Legislature, and it was passed upon the following day; and having been accepted by the Mayor, was approved by the Governor and became a law on February 8, 1900 (*Laws 1900, Ch. 7*).

Pending the passage of this act, the time for the execution of the contract was extended, and some correspondence was had with Mr. McDonald relative to the sureties upon his bonds. It was ultimately agreed with Messrs. August Belmont & Company, to whom Mr. McDonald had applied for assistance in his financial arrangements, that the following general plan should be pursued:

1st. Messrs. August Belmont & Company to organize a corporation under the laws of the State of New York with a capital of Six million dollars. This company (which was subsequently incorporated under the name of the Rapid Transit Subway Construction Company) to enter into a contract with Mr. McDonald to promote the construction of the work, to furnish the security given by him and to finance his undertaking.

2d. The Rapid Transit Board to make application to the Appellate Division to modify its requirements concerning the bond to be given for securing the construction of the work, by striking out the provision requiring justification in double the amount of the liability assumed by each surety, and by reducing the minimum amount permitted to be taken by each surety from Five hundred thousand dollars to Two hundred and fifty thousand dollars.

3d. Mr. McDonald to furnish the continuing bond for the payment of rent, etc., in the sum of One million dollars, with sureties who would justify in double that amount, and at the same time to deposit with the Comptroller securities of the value of One million dollars, which were ultimately to be substituted in lieu of the bond for that amount.

4th. The Rapid Transit Subway Construction Company to become surety on Mr. McDonald's bond to the amount of Four million dollars, the additional amount of such construction bond to be furnished by various surety companies.

5th. Mr. McDonald to deposit One million dollars in cash, as required by the contract.

6th. Mr. McDonald to assign to the City his beneficial interest in the bonds to be required of sub-contractors.

7th. Mr. McDonald to cause an additional One million dollars in cash, or the equivalent in securities, to be deposited with the Comptroller on or before January 1, 1901, such One million dollars to be held as additional security for the performance of the obligation of the sureties upon the bond for construction.

Inasmuch as this plan proposed security for the City much more available than that required by the Appellate Division, the Court acceded without hesitation to the suggestion and modified its requirements accordingly.

*(Matter of Rapid Transit Commissioners, 48 App. Div. 633.)*

The forms of the several bonds and other documents having been considered and approved by the Board, the contract was executed and delivered at the Comptroller's office on February 21, 1900, and the money, securities and bonds required from the contractor were at the same time duly delivered as above set forth.

#### TERMS OF THE CONTRACT.

The contract itself constitutes a printed volume of 180 pages. Omitting formal and technical details, its provisions may be summarized briefly as follows: The contractor undertakes to construct and equip the Rapid Transit Railroad upon the routes and general plan of the Commission; to put the same in operation; and to use, maintain and to operate it under a lease from the City for the term of fifty years. The City on its part agrees to pay Thirty-five million dollars in case the whole of the road is constructed, and other specified sums in case it should determine to construct less than the whole. The City stipulates to give the contractor the right to construct and operate the railroad "free of all right, claim or other interference, whether by injunction, suit for damages or otherwise on the part of any abutting owner or other person." All parts of the structure, where exposed to pub-

lie sight, are required to be designed, constructed and maintained with a view to the beauty of their appearance as well as to their efficiency, and all the work is to be done in a good, substantial and workmanlike manner, and in accordance with the detailed specifications embodied in the contract. The work to be done by the contractor is to include all necessary readjustment of pipes, subways or other subsurface structures; the support and care, including underpinning wherever necessary, of all buildings, monuments and elevated and surface railways; and the reconstruction of street pavements and surfaces. The construction of sewers, readjustment of mains, pipes and other subsurface structures, and the support, care and underpinning of buildings, monuments and railways are declared to be essential parts of the construction of the railway. The contractor is required to provide a complete equipment for the railroad, including not only cars, but also all engines, electric wires, conduits, power houses, and lighting, signalling and ventilation apparatus. The Board reserves the right during the progress of the work to amplify the plans, to add explanatory specifications, and to furnish additional specifications and drawings. It also reserves the right to require additional work to be done, on paying the reasonable value thereof to the contractor, or to require work to be omitted, in which case a reasonable deduction from the contract price is to be made. The contract further provides for the most thorough and minute inspection by the Board of all work and materials from the beginning of their manufacture or preparation, and declares that the work is to be done and the materials are to be furnished in all cases subject to the direction and approval of the Chief Engineer of the Board.

In case of any dispute or doubt as to the obligation of the contractor, the determination of the Engineer is to be so far binding that the contractor must, without delay, obey the requirements of the Engineer, leaving open the question as to his right to receive compensation for additional work. In case of dispute as to the value of extra work, an appeal may be taken from the decision of the Engineer either by the Board or the contractor to a Board of Arbitration, to be composed as provided in detail in the contract.

The contractor was required to begin work upon the railroad within thirty days after the execution of the contract, and to complete the entire road within four years and a half. If not completed within that time, the City is to deduct from the amount due to the contractor two per cent. a month until the balances are finally due. In case the contractor shall be delayed by injunction, or by strike, or by any interference of public authority, and cannot make up for the delay so occasioned by speedier work, then the date for completion may be extended by the amount of time of such delay, provided written notice of the delay is given in each case by the contractor to the Board.

With reference to terminals, the contract provides that the City shall itself purchase the real estate for the terminals by condemnation or otherwise, and that the contractor is to construct them and receive the cost of such construction, with a profit of ten per cent. But it is provided that the total amount to be paid by the City for the terminals shall in no case exceed the sum of \$1,750,000. This amount is to be in addition to the \$35,000,000 paid for the cost of construction. It is also provided that the City shall, if necessary, acquire lands for stations and other purposes of the railroad in an amount not exceeding \$1,000,000, and that if the necessary real estate should cost more than that sum, such excess is to be borne by the contractor. It was estimated by the Board that the cost of terminals would be One million dollars, and the cost of other real estate Five hundred thousand dollars.

The payments to the contractor for the work done by him for the construction of the road are to be made monthly upon written requisitions, accompanied by a certificate of the engineer showing the proportion of the whole work actually done. The Rapid Transit Board is authorized to fix the amount due at such sum as it may itself determine to be the proper actual relative value of such work and materials, and the amount so certified is to be forthwith paid by the City to the contractor. In case the contractor should be dissatisfied with the determination of the Board, an appeal may be taken to the Board of Arbitrators, already referred to.

By the time two-thirds in value of the work, exclusive of equipment, is finished, the contractor is bound to begin providing the



equipment of the railroad and to have such equipment completely ready for use three months in advance of the construction of the road.

The specifications included in the contract are intended by the Board to be full and comprehensive and show all the work required to be done. "The railroad," it is provided, "is to be constructed for actual use and operation as an intra-urban railroad of the highest class, adapted to the necessities of the people of The City of New York. . . . The contractor shall construct, complete and fully equip the railroad in the best manner and according to the best rules and usages of railroad construction, so that the railroad shall be thoroughly fitted for safe, continuous, immediate and full operation. . . . In the event of any doubt as to the meaning of any portion or portions of the specifications or contract drawings, or of the text of the contract, the same shall be interpreted as calling for the best construction both as to materials and workmanship capable of being supplied or applied under the then existing local conditions."

The contractor covenants that the work shall be done without fault or negligence on his part and that it shall not involve any damage to the foundation walls or other parts of adjacent buildings or structures, and he agrees, at his own expense, to make good any damage which shall be done in the course of construction. He also agrees, during the performance of the work, to maintain safely the traffic on all streets, to take necessary precautions to place proper guards for the prevention of accidents and to keep at night suitable lights.

The City leases to the contractor the whole railroad for fifty years from the time of completion. The contractor agrees to pay as rental a sum equal to the interest payable by the City upon the bonds issued by it to provide means for construction, and also one per cent. upon the whole amount of such bonds,—except that for the first five years the payment is not to be made unless the contractor's profits amount to five per cent. a year,—and for the next five years the payment is to be only a half of one per cent., unless the contractor's profits amount to five per cent. a year.

The contractor covenants to "operate the railroad carefully and skillfully, according to the highest known standards of railway

operation." Local trains are to run at a speed on the average, stops at station included, of not less than fourteen miles an hour. Express trains are to be run on the average, stops at stations included, at a rate of not less than thirty miles an hour. Between one o'clock and five o'clock in the morning trains are to be run, stopping at all stations, at intervals of not more than fifteen minutes.

The contractor covenants to save the City harmless from all accidents and to keep the railroad and equipment in thorough repair, so that at all times and at the termination of the lease the railroad shall be in thoroughly good and solid condition, and fully equipped for use. Stations and cars are to be kept thoroughly lighted and heated, so that passengers may conveniently read. The waiting-rooms are to be kept in clean and comfortable condition, proper seating capacity is to be provided and good drinking water, as also sufficient and suitable water closets, which are to be kept in a sanitary condition. All tunnels, stations and cars are to be thoroughly ventilated with pure air, and all tunnels are to be thoroughly lighted at all times, so as to permit the tracks, walls and roofs to be clearly visible to inspection.

The motive power is to be electricity or compressed air; but it is provided that if, in the future development of the railway art, any method of generating or transmitting power superior to electricity, and involving no injury to the purity of the atmosphere in the tunnels or cars, shall be discovered to be practicable, then the contractor shall have the right to adopt such method, if approved by the Board, on two months' notice.

The contractor agrees to provide rolling stock of the best character known at the time, and the Board reserves the right to make good any neglect on this point of which the contractor may be guilty. The rolling stock is to be adequate to the requirements of the traveling public, and a schedule is to be filed every six months showing in detail all of the equipment owned by the contractor.

The contractor is entitled to charge for a single fare upon the railroad not more than five cents; but it is provided that "the contractor may provide additional conveniences for such passengers as shall desire the same upon not to exceed one car upon each train, and may collect from each passenger in such car a reasonable

charge for such additional convenience furnished by him, provided that the amount to be charged therefor and the character of such additional conveniences shall, from time to time, be subject to the approval of the Board."

At the option of the contractor a new lease of the road is to be granted to him for a period of twenty-five years from the expiration of the lease provided for in the contract. Such renewal lease is to be in the same general form, but the rent is to be an amount to be agreed upon, not less than the average amount of the annual rental for the ten last years of the lease. In case of failure to agree upon the rental it is to be fixed, subject to such minimum, by arbitration.

At the final termination of the lease the City is to buy of the contractor the equipment at a price to be fixed by agreement or by arbitration; but at the termination of the lease, even though the price has not been determined on, the equipment is to be turned over to the City for use subject to the future adjustment of the amount to be paid.

#### CONSTRUCTION BEGUN.

On March 24, 1900, the work of construction of the Rapid Transit Railroad was formally begun in front of the City Hall, the Mayor of the City turning the first spadeful of earth. The work of construction then began and has since been steadily prosecuted. It was not, however, possible, either for the Board or for the contractor, to organize their staffs so as to enable very rapid progress to be made for several months after the formal commencement of the work.

The organization adopted by the Board for its engineering staff consisted of a Chief Engineer (Mr. Parsons), a Deputy Chief Engineer, six division engineers, five general inspectors, a private secretary, an auditor and a photographer. All the above positions were exempted from competitive examination by the Civil Service Commission. In addition, a number of assistant engineers, inspectors, draughtsmen, stenographers and messengers were required, all of which positions were to be filled by competitive examination pursuant to regulations of the Civil Service Commis-

sion. A statement of the present organization and members of the Commissioners' staff appears in the *Appendix* to this report.

#### MODIFICATION OF ROUTE AND PLANS.

The work of constructing the railroad has proceeded without serious interruption or difficulty and without modification of the plans originally proposed, except in certain matters of minor importance.

On July 12, 1900, the Board agreed to modify the contract as follows:

1st. The station platforms for local trains above 104th Street, and for express trains below that point were to be extended to lengths not exceeding 450 feet, thus permitting somewhat longer express trains than were at first contemplated.

2d. The loop and terminal tracks at the Post Office Building were modified so that instead of passing completely around the building, the entire loop was to be constructed between the City Hall and the Post Office.

3d. The widening of the Subway at the Spring Street Station for the purposes of the station, was to be extended so as to permit the construction of not more than 600 feet of side-track.

On June 21, 1900, as the result of considerable discussion, it was resolved to modify the route of the railroad from Fort George to Kingsbridge by diverting the route somewhat to the eastward, so as to pass along Naegle Avenue and Amsterdam Avenue to the Kingsbridge Road. The necessary papers were prepared and executed by the Board, the contractor and his sureties, and were submitted to the municipal authorities for their consent on November 1, 1900. No action was taken by the Municipal Assembly on this subject until May 21, 1901, when the proposed change of route was approved by the Assembly and their resolutions were approved by the Mayor on June 1, 1901. Efforts to obtain the consent of the property-owners along the line of the proposed road are still pending, the consent of a majority not yet having been obtained.

#### BROOKLYN EXTENSION.

At the first meeting of the Board in 1900 a large and important delegation from Brooklyn appeared to advocate the construction of a tunnel under the East River to connect with the railroad under construction in Manhattan and the Bronx. Immediately after the execution of the contract with Mr. McDonald, the Board on February 26, 1900, instructed the Chief Engineer to investigate the practicability and cost of an extension of the Rapid Transit Railroad from the City Hall to the South Ferry, and thence under the East River to the Borough of Brooklyn.

Pending this inquiry, certain statutory difficulties required and received attention. The original Act of 1894, passed before the consolidation of the former City of New York with Brooklyn and other outlying municipalities, contemplated the construction of a Rapid Transit Railroad only within the former City. The vote of the people in November, 1894, had reference also to a road to be constructed within the limits of the former City. It was, therefore, a question of some doubt whether the Board was authorized to establish a route and general plan for the construction, with the funds of the City, of a road extending into the Boroughs other than Manhattan and the Bronx. Accordingly a bill was introduced into the Legislature amending Sections 4, 34 and 35 in such a manner as to extend the powers of the Rapid Transit Board into all parts of the Greater City of New York. This bill was passed by the Legislature, accepted by the City, and became a law on April 23, 1900, with the approval of the Governor (*Laws 1900, Ch. 616*).

On several occasions in the month of May, 1900, the Board gave public hearings at which the question of the Brooklyn extension was very fully and thoroughly discussed. In general two routes were favored. The first a route extending from Broadway to Whitehall Street under the East River and up Joralemon Street, Fulton Street and Flatbush Avenue to Atlantic Avenue. The second, a route following the same line in the Borough of Manhattan, but reaching Hamilton Avenue in Brooklyn, and thence proceeding towards South Brooklyn and Bay Ridge. After

extensive study of the question, the Board on January 24, 1901, adopted by formal resolution a general route and plan for a new rapid transit railroad.

On February 2, 1901, the formal resolution of the Board was transmitted to the Municipal Assembly with a communication from which the following is an extract:

BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS,  
No. 320 BROADWAY, NEW YORK.

*To the Honorable the Municipal Assembly of The City of New York:*

The Board of Rapid Transit Commissioners for The City of New York, \* \* \* immediately after the contract for the rapid transit railroad within the Boroughs of Manhattan and the Bronx was made in February last, and the work to which the efforts of the Board had so long been directed had been successfully inaugurated, took up the subject of rapid transit between the Boroughs of Manhattan and Brooklyn; and it now submits its conclusions.

The rapid transit railroad already begun extends from the end of the Brooklyn Bridge, near the City Hall, in the Borough of Manhattan, to two termini, one on the west side, near the northern line of the Borough of Manhattan, and the other on the east side, in the northerly part of the Borough of The Bronx. The next rapid transit route in the order of importance is clearly one connecting the Borough of Brooklyn with the system already begun; and it is obvious that, in establishing that route, it will be convenient to extend the system already begun from the station at the City Hall and Brooklyn Bridge to the South Ferry. At the latter point connection will be made with ferries to various parts of the Boroughs of Brooklyn and Richmond. The extension to Brooklyn will thus complete the system in the Borough of Manhattan to the south end of Manhattan Island; and it will, in the opinion of this Commission, serve to improve very materially the communications between Richmond and the various parts of Manhattan and the Bronx.

The Brooklyn-Manhattan road, now proposed, will, from a point near the intersection of Whitehall and South Streets, in Manhattan, proceed under the East River to Joralemon Street, in the Borough of Brooklyn, thence under Joralemon Street to Fulton Street, near Borough Hall, thence under Fulton Street to Flatbush Avenue, and

under Flatbush Avenue to Atlantic Avenue, near the station of the Long Island Railroad. The cost, as the Board is advised, will not exceed about Eight million dollars.

The Board is aware that the route now proposed does not afford a complete solution of the rapid transit problem in the Borough of Brooklyn. It is, however, beyond doubt, the best route for the first rapid transit connection between the boroughs. It reaches two great distributing points in Brooklyn, Borough Hall Park and the Long Island Railroad Station. The new road can thence be conveniently extended, as the financial means of the City will permit, to any and every important district in Brooklyn. It is the interest of the City that the rapid transit connection now proposed between the boroughs should be promptly constructed rather than that the City and especially the Borough of Brooklyn should be made to wait several years for the initiation of a system more nearly complete.

The road is to be in tunnel, thus permitting easy connection with the Rapid Transit System already begun in Manhattan and The Bronx. A tunnel under the East River will be far less expensive than another bridge over it.

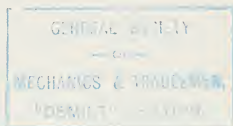
The principal features of the plan of construction are those with which your Honorable Body is already familiar in the Rapid Transit System now under construction.

1. The tracks are to be placed substantially upon a level, except when engineering reasons require a greater or less depression of one track.

2. The railway, except when under or approaching the East River, is to be as near the surface as street conditions will permit, thus rendering the road more accessible to passengers. Where stations are not near the surface they will be reached by elevators.

3. The entire depth of excavation necessary for the construction of the railroad and its foundation will, except in approaches from Bowling Green in Manhattan and Borough Hall in Brooklyn to the tunnel under the river, be only about twenty feet. There is no portion of the road now proposed where construction conducted with ordinary care involves risk to neighboring buildings.

4. The method of construction proposed by the Board is neither experimental nor untried. The work will be attacked at as many points along the route as may be desirable. The progress of the construction will be expedited so that the discomforts and delays resulting therefrom will be reduced to a minimum.



5. The railway tracks are to be of standard gauge and the railway cars will be large and commodious.

Hearings on the subject of the Brooklyn extension were had before the Municipal Council and a Committee of the Board of Aldermen extending from February 13, 1901, to May 3, 1901. On May 21, 1901, the Municipal Assembly approved the proposed extension under the East River to Flatbush and Atlantic Avenues, Brooklyn, and their resolutions were approved by the Mayor on June 1, 1901. The Park Board gave its consent to the construction of the proposed railroad on July 11, 1901.

The Rapid Transit Board having taken steps to secure the consent of the property-owners along the proposed route, and having failed to secure the consent of a majority, made application to the Appellate Divisions of the Supreme Court in New York and Brooklyn for the appointment of Commissioners to determine whether the road should be built. The Appellate Division in the First Department appointed as such Commissioners Messrs. Theron G. Strong, Thomas C. T. Crain and Henry W. Gray. The Appellate Division in the Second Department appointed as such Commissioners Messrs. Wm. C. Bryant, Richard H. Laimbeer and Frederick R. Kellogg. By agreement between the two Boards of Commissioners these gentlemen sat together to take testimony, thus greatly expediting the proceedings. The Commissioners reported favorably to the Court on December 26, 1901 and December 27, 1901, respectively.

#### CONNECTION AT GRAND CENTRAL STATION.

In October, November and December of 1900, the President and the Engineer, under the instructions of the Board, took up with the New York Central Railroad Company the question of connecting the Rapid Transit Railroad with the lines of the various railroad companies now using the Grand Central Station at 42nd Street, in order that the Rapid Transit trains could be run north over the lines of the New York Central, Harlem and New Haven railroads, so as to supply the demands of the suburban service without necessitating a change of cars at Forty-second Street, and on the



18th of October, 1900, Mr. Orr addressed Mr. W. K. Vanderbilt the following letter outlining the plan proposed:

W. K. VANDERBILT, Esq., Grand Central Station:

MY DEAR SIR—Under my instructions, the Chief Engineer of this Board, Mr. Wm. Barelay Parsons, called upon you on October 9 last, and presented to you and Mr. Callaway our suggestion for connecting the tracks of the Grand Central Station with those of the Rapid Transit System. Following the line of this interview he has since submitted to your Chief Engineer, Mr. Wilgus, a map and profile indicating how such a connection could be made.

This plan was based upon the fundamental condition laid down by you at the interview, that the Rapid Transit Railway must not at any point be on the Grand Central Station property. Your requirement necessitates placing the junction in Park Avenue; and even when using our maximum grades, would put it south of Thirty-ninth Street.

Since submitting the map to Mr. Wilgus, it has been laid before this Board. After a careful consideration of all its features, it is the opinion of the Board that, if your conditions are to be strictly adhered to, the objections to the plan are almost, if not quite prohibitory; and this opinion is shared by the officers of the company that will operate the Rapid Transit Railway.

A connection so made will be extremely expensive. It will require two separate stations—one in Park avenue, near Thirty-eighth Street, and one in Forty-second Street, near Madison Avenue. The junction will be at some distance from the station, at a point where trains will be running at high speed. Above all it will absolutely limit any development of the Rapid Transit System on the east side. It is quite evident that at no very distant day there will be required in New York an east-side line above Forty-second Street distinct from the west-side line, and a junction with the present route will most naturally be made where the latter diverges from Park Avenue to the westward along Forty-second Street. This would be prevented by such a connection as you suggested.

We are, therefore, unable to see how a proper connection can be made without our tunneling to some extent through the soil on which the Grand Central Station stands.

A suitable, direct, physical connection between the tracks of the Grand Central Station and those of the Rapid Transit Railway which

we are now constructing by which your suburban trains could be run south as far as the City Hall or South Ferry, or even to Brooklyn, would seem to be of the greatest value to all concerned. It would, of course, relieve all passengers on such trains from the delays and annoyance incident to change of cars. It would obviously add enormously to the comfort and convenience of the numerous commuters on the New York Central, the Harlem and the New Haven roads. By thus stimulating your large and profitable suburban traffic, and by relieving the Grand Central Station—without expense to its owners—of many trains each day, the arrangement appears to this Board likely to be beneficial to all the three roads using the station. It certainly would be to the interest of the company which will operate the Rapid Transit Railway.

I am therefore directed by this Board to lay the above facts before you, and to ask that before you come to any final decision, prohibiting the Rapid Transit Railway from occupying any of the space beneath the Grand Central Station, the whole matter may be open to joint investigation. Otherwise I fear that your decision must be regarded as tantamount to a refusal to make any connection.

I need scarcely say that this Board is most desirous not to interfere in any way with the development of your property. But it seems to us that it would be possible, either by depressing our tracks, or by some other suitable engineering device, to effect a convenient connection without any embarrassment to you. To this end the Board directs me to inquire whether it would be agreeable to you to submit to us, in confidence, such plans as you have in view for the future development of the Grand Central Station, so that we may take up understandingly the question of making a connection at such a depth below the surface, or otherwise, as will not restrict the carrying out of your plans.

It seems to this Board, speaking from the standpoint of those who use your railways, that the benefits that will flow from such a connection as we have in mind will be as great as any that can flow from any possible improvement, and the Board hopes that the whole question may be studied in all its bearings before you come to a final decision.

Respectfully yours,

(Signed)

A. E. ORR,  
*President.*

After sundry correspondence between Mr. Orr and Mr. Vanderbilt and Mr. Callaway, President of the New York Central Railroad Company, the connection was finally declined by Mr. Callaway on the grounds that our "plans are, when an electric or air motor can be had to run our trains any considerable distance, to tunnel underneath the depot and use the space there for our own suburban service. If your line is built across Forty-second Street, a connection can easily be made with this proposed line."

The Board deeply deplored their failure to make the physical connection by which through trains could be run, but it was found impossible to induce the Directors of the Railroad Company to co-operate with it.

#### PIPE GALLERIES.

As already stated, the plans proposed by the Commission in 1895, provided for pipe galleries along the line of Broadway, for the reason that the number of pipes and other subway structures in that street made it impossible to replace them unless suitable galleries were provided. The Board was, however, of the opinion that it would have no power to authorize or require the construction of such galleries in any part of the line where they were not essential. In the general plan for the Elm Street route the Board had reserved the power to cause such galleries to be prepared, but it had not included in the contract with Mr. McDonald any requirement that they should be constructed. Soon after the execution of the contract the question was brought to the attention of the Board by the Comptroller, and a resolution was adopted instructing the Chief Engineer to prepare an estimate of the cost of the construction of pipe galleries from the City Hall Park to 33rd Street. The Chief Engineer under date of March 16, 1901, reported that there was no need for pipe galleries below Worth Street, and that their cost would probably not exceed \$850,000. On March 22, 1900, the Chief Engineer further reported that he deemed it necessary to have pipe galleries along Elm Street from Worth Street to Astor Place, because, since the specifications of the contract had been prepared, large water and gas mains had been laid along Elm Street in addition to the existing lines, and he therefore advised

the Board that it was necessary on this part of the line to build galleries at a cost which he estimated at about \$425,000. The Board had received a letter from the President of the Rapid Transit Subway Construction Company which the Board had interpreted as indicating a willingness on the part of the contractor to construct these galleries as a part of his contract, the same to be paid for as extra work, and a requisition upon the contractor to that effect was made by the Board. The contractor accordingly entered upon the work of construction and made some progress in building the galleries.

On November 1, 1900, the Board was notified by the Commissioner of Sewers that he objected to the proposed plans for the pipe galleries. His letter was accompanied by a statement that the Chief Engineer of the Department of Water Supply concurred in thinking "that it would be to the best interests of both Departments if the pipe galleries were not built at all, and the sewers and water mains were laid in the usual manner." The Board accordingly addressed a communication to the Mayor, the Comptroller, the President of the Board of Public Improvements, the Commissioner of Sewers, Highways and Water Supply, and the Contractor. In this communication the Board stated that its action in requiring the contractor to build pipe galleries had been widely published and met, as it supposed, with the approval of the City officials and the public generally, and that it had never had an intimation to the contrary until the receipt of a letter from the Department of Sewers. The Board added:

"It was our own belief that the building of these galleries would be the inauguration of a great and urgent reform in the construction of underground works. The proposed pipe galleries are not, however, in any way essential to the rapid transit road. The road will be as safe, as complete and as efficient whether the pipes and sewers are placed in galleries or are buried in the earth. But the public, and especially the property-owners along the line, are vitally interested; first, they are interested in the proper maintenance of all the innumerable underground conduits on which the life of a modern city so largely depends; and, second, they are interested in avoiding the incessant disturbance of street surfaces which existing methods necessarily entail. The experiment of pipe galleries may

now be tried on a fairly large scale in Elm Street, under exceptionally favorable circumstances, because the work can be performed as an incident of constructing the underground railroad, and because it can be done without expense to the City. As the matter is one not directly affecting the construction of the rapid transit railroad, it is the opinion of this Board that the City authorities,—representing the public generally,—ought to declare whether they wish the experiment tried or whether they prefer to adhere to the present system of burying the sewers and pipes. Whatever conclusion the City authorities may reach in this matter the Rapid Transit Board will be disposed to adopt."

In reply to this communication letters were received from the Department of Water Supply, the Department of Highways, the Department of Sewers, the President of the Board of Public Improvements, the Comptroller, and the Contractor. The City authorities which replied to the Board expressed serious doubt as to whether a plan could be devised for pipe galleries which would be practicable, and they also raised certain difficulties as to the control of the pipe galleries after construction. The Contractor, Mr. McDonald, wrote that, as it appeared that the heads of the City Departments most directly affected by the proposed construction and arrangement were opposed to the plan, and as the construction would involve unanticipated difficulties, and as no general scheme of extension and development of sub-surface construction had been proposed or authorized, he thought it inexpedient to continue the building of the galleries in Elm Street.

On November 28, 1900, Mr. McDonald addressed a further letter to the Board stating that he had been under some misapprehension as to the liability of the City and of the contractor with respect to the burden of the maintenance of these pipe galleries. Under these circumstances, and in view of the opposition of the heads of the City Departments directly concerned, he requested that the plan of constructing these galleries should be abandoned and the orders for their construction rescinded. He further stated that the expense which would be incurred as the result of the abandonment of the pipe galleries would be assumed by him. The Chief Engineer having reported to the Board that, on examination

of the existing pipes and sewers, he found it would be at least possible to arrange for their disposal either on the sides or on the top of the subway, the Board resolved to withdraw the requisition upon the contractor for the construction of the pipe galleries.

#### CONDEMNATION PROCEEDINGS.

The Board having taken steps to acquire by condemnation certain property and casements, it was found that various provisions of the law raised unnecessary difficulty. In particular it was doubtful whether proceedings could be begun to acquire more property than would ultimately be necessary,—although very necessary at the outset; as, for example, where the road passed under private property so close to the surface that it would be necessary to destroy buildings, it was doubtful whether the Act gave authority to do more than condemn a right of way under the surface, although in order to construct the road it might practically be necessary to take down the buildings and to open the ground from the surface. It was believed that much economy would result if the entire fee could be condemned, and that after the construction of the road the surface could be sold subject to the right of way beneath it. It was also considered that a period of six months after the appointment of Commissioners of Appraisal was a sufficient time for owners of property to file their claims for damages. Other amendments to the law were also proposed by the Board but were not accepted by the Legislature.

A bill was passed by the Legislature embodying the specific amendments above mentioned to the provisions of the Rapid Transit Act in Sections 39 and 55, which relate to proceedings to condemn rights of property; and this Act became a law on April 27, 1901, with the approval of the Governor (*Laws 1901, Ch. 587*).

Several proceedings to condemn property have been begun, and are now pending; but the contractor has been put in possession,—the question of compensation being the only one before the Court.

## TERMINALS.

On December 20, 1900, the contractor addressed a letter to the Board requesting the modification of the plans of the Manhattan Valley Viaduct so as to provide for a three-track structure and the construction of a third track at the 110th, 116th and 145th Street stations. On January 24, 1901, a resolution was adopted authorizing the construction of three tracks on the viaduct over Manhattan Valley, and for a third track with suitable cross-overs and connections through the stations at 104th, 110th and 145th Streets.

Later the contractor requested the construction of a third track to be used mainly for the storage of cars. On March 7, 1901, the Board adopted a resolution authorizing the construction of "a third or storage track" from 103rd to 116th Street, which it was proposed should be treated as part of the terminal facilities of the road, and used for the storage of cars. The cost was to be deducted from the contract allowance for terminals.

On April 25, 1901, the contractor applied for permission to construct a third track all the way from 103rd Street to 137th Street, a part of which had already been authorized. He also applied for permission to construct three tracks on either side of the main line between the stations at 137th Street and 145th Street, these, also, to be part of the terminals. The Board accordingly on May 2, 1901, adopted resolutions rescinding the resolution of March 7 and authorizing the execution of a contract modifying the original contract, by providing that one track for express trains should be constructed along Broadway from 103rd Street to the southerly side of 137th Street, the work of such construction to be paid for as extra work; and that three additional tracks should be constructed on either side of the main line between the 137th Street and 145th Street stations which should be paid for as terminals out of the \$1,750,000 fixed by the contract as the maximum liability of the City for the cost of terminals.

On the east-side line the question of terminals has, the Board trusts, been disposed of by the purchase by the Contractors of a

large tract of land on the Harlem River near 150th Street. If this very advantageous arrangement is to be made, it becomes necessary to extend the road from 143rd Street along Lenox Avenue to the site of the terminals. Such extension was voted by the Rapid Transit Board on October 24, 1901, and the communication was sent to the Municipal Assembly on November 25, 1901, asking the consent of the City authorities. The matter is still pending before that body. If the requisite consents are given, it is proposed to construct a station at 145th Street instead of 141st Street, and to start a certain number of trains from that point instead of from Bronx Park. This would greatly promote the convenience of Harlem travel.

THE BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS,

A. E. ORR,  
*President.*



APPENDIX I.

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RAPID TRANSIT COMMISSIONERS

AND

STAFF.



# RAPID TRANSIT COMMISSIONERS.

NAME	DATE OF ELECTION OR APPOINTMENT.	REMARKS.
Alexander E. Orr,	Appointed by Act of May 22, 1894. President N. Y. Chamber of Commerce, June 8, 1894. Elected President of the Board, June 8, 1894. Elected member of Board May 11, 1899. Re-elected President May 23, 1899.	Resigned, June 8, 1894. Term of office expired May 5, 1899.    Now in office.
John H. Starin,	Appointed by Act of May 22, 1894. Elected Vice-President, May 28, 1895.	 Now in office.
William Steinway,	Appointed by Act of May 22, 1894.	Died Nov. 30, 1896.
Seth Low,	Appointed by Act of May 22, 1894. Mayor Jan. 1, 1902.	Resigned June 11, 1896. Now in office.
John Claflin,	Appointed by Act of May 22, 1894. Elected Treasurer May 28, 1895. Elected member of Board Dec. 27, 1901.	Resigned May 11, 1899.  Now in office.

# RAPID TRANSIT COMMISSIONERS.—*Continued.*

NAME.	DATE OF ELECTION OR APPOINTMENT.	REMARKS.
Thomas F. Gilroy,	Mayor, June 8, 1894.	Term of office ex- pired Dec. 31, 1894.
Ashbel P. Fitch,	Comptroller, June 8, 1894.	Term of office ex- pired Dec. 31, 1897.
John H. Inman,	Elected, June 8, 1894.	Died Nov. 5, 1896.
William L. Strong,	Mayor, January 1, 1896.	Term of office ex- pired Dec. 31, 1897.
Woodbury Langdon,	Elected November 19, 1896.	Now in office.
George L. Rives,	Elected November 19, 1896.	Resigned Dec. 27, 1901.
Charles Stewart Smith,	Elected Dec. 10, 1896.	Now in office.
Robert A. Van Wyck,	Mayor Jan. 1, 1898.	Term of office ex- pired Dec. 31, 1901.
Bird S. Coler,	Comptroller Jan. 1, 1898.	Term of office ex- pired Dec. 31, 1901.
Morris K. Jesup,	President N. Y. Chamber of Com- merce, May 5, 1899.	Now in office.
Edward M. Grout,	Comptroller Jan. 1, 1902.	Now in office.

## STAFF OF THE COMMISSION.

NAME.	DATE OF ELECTION.	REMARKS.
Wm. Barclay Parsons,	Chief Engineer, June 18, 1894.	
Henry R. Beekman,	Counsel, June 18, 1894.	Resigned, Jan. 1, 1895.
Albert B. Boardman,	Counsel, June 18, 1894.	
Messrs. Tracy, Boardman & Platt (Now Messrs. Boardman, Platt & Soley),	Counsel, Jan. 1, 1895.	
Messrs. Parsons, Shepard & Ogden,	Counsel, Jan. 1, 1895.	
Lewis L. Delafield,	Secretary, June 18, 1894.	Resigned, June 1, 1899.
Bion L. Burrows,	Secretary, June 1, 1899.	
H. A. D. Hollmann,	Auditor, May 10, 1900.	
James Dolan,	Messenger, June 28, 1894.	



APPENDIX II.

PROCEEDINGS

ON THE

PRESENTATION OF A GOLD MEDAL

TO THE

HONORABLE ABRAM S. HEWITT.





**Proceedings**  
ON THE  
PRESENTATION OF A GOLD MEDAL  
TO THE  
Honorable ABRAM S. HEWITT.

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At the monthly meeting of the Chamber of Commerce, held October 3, 1901, the Gold Medal ordered by the Chamber was formally presented to the Honorable ABRAM S. HEWITT by Mr. MORRIS K. JESUP, President.

In accepting the gift, Mr. Hewitt said:

"MR. PRESIDENT AND GENTLEMEN: I am sure that you and every member of the Chamber will sympathize with my inability to find suitable words to express my profound sense of the honor conferred by the presentation of this beautiful medal, the artistic excellence of which greatly enhances the gratitude which I feel, but to which I cannot give adequate utterance. In the course of a long life, devoted largely to the public service, I have been more accustomed to criticism than to commendation, although at the hands of this Chamber I have never lacked the cordial approval which is so grateful to public servants. The present honor would, perhaps, have been deferred until the completion of the Rapid Transit System, with which this occasion will imperishably link my name. Time, however, moves with relentless tread, and when a man reaches his eightieth year, it may well be supposed, as doubtless it was by the Chamber, that whatever recognition it desired to make during my lifetime should be quickly done. I regard it, and my family will always look upon it, as the seal of your approbation upon my public career. [*Applause.*] No man need expect a higher honor, for the Chamber of Commerce represents in a unique degree the solid judgment of the leaders of commerce and industry in this great City. Necessarily the gracious remarks of your President have had a personal direction, and in the reply which I propose to make, I trust I may be acquitted of any

want of modesty in narrating the circumstances which have connected me with the great system of Rapid Transit now nearing its completion.

"I am not the author of the idea of rapid transit in this City. It is an old story, but the circumstances probably ought to be recalled on the present occasion, even at the risk of being somewhat tedious, in order that your records may show how it has come to pass that the Chamber of Commerce is so thoroughly identified with this great enterprise.

"For many years prior to my election as Mayor in 1886, I had given careful study to the means of communication in the City of New York, and had been connected in various ways with the changes required from year to year since 1850, when I was concerned in the manufacture of the first tram rails for street railroads in this country. For a time the demand for increased movement of passengers was met by the construction of these tram roads on the leading avenues of the City. The growth of business, however, made it apparent that some better mode of transit should be devised in the near future, and at various times propositions were made for building railways overhead and underneath the surface of the streets. In 1868 the Legislature granted a charter to the New York City Central Underground Company, with ample powers as to route, capital and facilities for construction. Under this charter, however, it was found impossible to raise the money required for the construction of the road.

"In 1872, therefore, the Legislature incorporated the New York City Rapid Transit Company, authorizing Cornelius Vanderbilt and his associates to construct and operate an underground railway, which would have connected the City Hall with the Grand Central Station. This corporation was duly organized, and the necessary surveys and plans were made for the construction of the railroad. Unfortunately, however, the criticism which this grant produced in the newspapers and elsewhere, brought Commodore Vanderbilt to the conclusion that he would not construct the proposed underground railway, and to this decision the members of his family, who succeeded in the management of the New York Central Railway, uniformly adhered, although they, as well as he, always insisted that the extension at that time ought to have been

made, and would probably be profitable, at least to the New York Central Railroad.

"Various other grants were made by the Legislature, among which the most conspicuous was what was known as the "Arcade Railroad," originally proposed to be built by the Beach Pneumatic Railroad Company. It was then found, however, that capital could not be secured by any of these companies, and hence the undertakings were practically abandoned as early as 1875. In that year, what is known as the Rapid Transit Act was adopted, under which the elevated railroads were constructed. The completion of these railroads relieved the congestion of travel to such an extent that no substantial complaint existed until about the year 1884, when the pressure for an underground railroad system reappeared, and the subject occupied much public attention and very general discussion, which I followed with great interest. It was evident to me that underground rapid transit could not be secured by the investment of private capital, but in some way or other its construction was dependent upon the use of the credit of the City of New York. It was also apparent to me that if such credit were used, the property must belong to the City. Inasmuch as it would not be safe for the City to undertake the construction itself, the intervention of a contracting company appeared to be indispensable. To secure the City against loss, this Company must necessarily be required to give a sufficient bond for the completion of the work and be willing to enter into a contract for its continued operation under a rental which would pay the interest upon the bonds issued by the City for the construction, and provide a sinking fund sufficient for the payment of the bonds at or before maturity. It also seemed to be indispensable that the leasing Company should invest in the rolling stock and in the real estate required for its power houses and other buildings an amount of money sufficiently large to indemnify the City against loss in case the lessees should fail in their undertaking to build and operate the railroad.

"These views were communicated to the Common Council in the Mayor's message of January, 1888. They did not receive the approval of the Common Council. In this communication it was suggested that the New York Central Railroad Company might be induced to undertake the construction and operation of the under-

ground road. On consultation with the officers of that Company, I found that their co-operation could not be secured. Hence in drawing the Act, which was submitted to the Legislature, it was made general in its character, and provision was made for competition on the part of any and all responsible individuals or corporations, who might be disposed to undertake the work. The Act thus drawn was submitted to the Legislature in 1888. The prejudice against the scheme was so great, however, that it was difficult to find any member of the Legislature who would be responsible for the introduction of a Bill, which was opposed, not only by the Common Council of the City, but by the political organization which controlled the politics of the City.

"The Mayor appeared, however, before the Committee of the Legislature and made a very elaborate argument as to the necessity for increased Rapid Transit facilities, and of the mode under which he proposed to secure them at an early date. The Committee, however, declined to report the Bill back to the Senate, and so far as the session of 1888 was concerned, the proposition entirely failed.

"Nothing further was done in this business until 1891, when the pressure of travel had become so excessive that some action was demanded by public opinion. The result was the passage of Chapter 4 of the Laws of 1891, under which the Rapid Transit Commission of that year was appointed, and in October, 1891, reported a plan of Rapid Transit, mostly underground, which in accordance with the provisions of the statute, was approved by the Board of Aldermen, by the Department of Public Parks, by the Commissioner of Street Improvements of the Twenty-third and Twenty-fourth Wards, and by the Supreme Court.

"Bids were then invited for the construction of this work by private capital, as required by the provisions of the Act of 1891. The attempt thus to secure the construction of the line failed, and the whole scheme was practically abandoned, although the Commission still continued to exist, but without power to take further action.

"In the meantime the difficulties of the situation became more and more manifest, until at length a proposition was made to the Chamber of Commerce of the State of New York by a well-known

and responsible banking house in this City to undertake the construction of the underground system, provided the City of New York would loan its credit to the corporation undertaking the work to an amount not exceeding thirty millions of dollars. This proposition was referred to a Committee of the most prominent members of the Chamber, who, despairing of any other solution of the question, reported at a meeting of the Chamber in favor of the proposition. It was my privilege to point out in the discussion which followed that such a loan of credit would be contrary to the Constitution of the State of New York, and that it was not expedient to submit to the people any proposition under which the public credit could be utilized for private enterprises. The importance of vesting the ownership in the City was insisted upon, and, after full discussion, my contention was unanimously approved by the Chamber of Commerce, and a new Committee, of which I was a member, was constituted to formulate a Bill to be presented to the Legislature under which the suggestions made by the Mayor in 1888 were to be incorporated into the proposed legislation. Taking the original Bill as a basis, and with the aid of the late Henry R. Beekman, who, as Corporation Counsel, had drawn up the original Bill, a new Bill was prepared and reported to the Chamber of Commerce for its approval. For this unselfish and inestimable service the City owes a debt of gratitude to the memory of Judge Beekman. Having received a unanimous vote in its favor, the Committee caused it to be submitted to the Legislature, where, after full discussion and some amendments, one of which required a referendum to the people, the Bill was enacted into a law on the 22d of May, 1894. Under this Bill the present Rapid Transit Commission was organized. Under its provisions the work is to be done as was proposed by the Mayor in 1888 by the issue of bonds under contract open to public competition, providing for an adequate bond for the completion of the work, and for the investment of a large amount of capital, estimated between seven and ten millions of dollars for rolling stock, real estate and appliances, all of which are held by the City as security for the fulfillment of the lease by the lessee.

"The rental to be paid by the contracting company is sufficient to meet the interest upon the bonds issued, and to provide a sink-

ing fund for the payment of the bonds at maturity. The contractors take all the risk of the construction and of the paying elements of the enterprise. The capital required is provided at the lowest possible cost, and the work being executed by the contractors is also carried on with all the economy which private interest invariably secures. The only concession which is made to the contracting corporation is immunity from taxation during the life of the lease. This is, in fact, a concession in theory rather than in practice, because if the work were not constructed there would be no property to be taxed. The great object aimed at was to secure the early completion of the work, its continued ownership by the City, and its reversion at the end of fifty years to the City free and clear of all encumbrances of every kind and nature whatever. The coming generation can therefore arrange for the operation of the road either at cost, or, if it be continued on a profitable basis of fare, for a reduction of general taxation.

"It is proper here to advert to the misapprehension under which a Justice of the Supreme Court seems to have labored in some recent remarks which he has seen fit to make in regard to this legislation. The learned Justice did not seem to be aware that the contract had been open to competition to all bidders, and that the reduction in the amount of the bond to be given from fifteen millions to five millions of dollars made by the Supreme Court was ordered before any bids were received or considered. He seems to have been ignorant of the fact that all attempts to secure rapid transit by the investment of private capital involving the exemption from taxation had absolutely failed. He did not seem to know that up to the actual opening of the bids it was extremely doubtful whether any responsible bidders could be secured. The efforts of the Rapid Transit Commission in that direction were unremitting, and their applications were not received with favor in responsible quarters whose support they hoped to secure.

"It is by no means certain that the contracting company will, for a considerable time, be able to realize any profit from the operations of the railroad, although the outlook is now much more favorable than at the time when the contract was made. The estimate of the profit which was to be made by the contractors out of

the enterprise was purely conjectural, but is generally agreed by competent men familiar with great public works that the terms of the contract are unusually favorable to the City. One thing is certain that the Rapid Transit System adopted by the Commission will be fully completed and put in operation without involving any additional taxation whatever, and at the end of fifty years it will be the absolutely unencumbered property of the City. Compared with other enterprises in other cities it must be conceded that the arrangement made for the construction of this work is the most favorable that has ever been devised or accomplished. [*Applause.*]

"In achieving this result the Chamber of Commerce has been the prime mover, and I think it is not too much to say that in the future its successful intervention will be regarded as one of the most creditable achievements in its long and honorable history, identified, as it was and is, with the construction of the Erie Canal and of the great system of water supply which has made it possible for more than three millions of people to dwell together in health and comfort.

"If by the continued efforts of the Chamber of Commerce we can secure a municipal government which will enable great public works to be undertaken and carried to completion with the same economy and honesty as have characterized the execution of the Erie Canal, the Croton Water Works, and the Rapid Transit system, no reasonable limits can be assigned to the future growth of this City in prosperity and grandeur. [*Applause.*]

"In conclusion, I take this occasion to thank the members of the Chamber for the confidence which they have uniformly manifested in my efforts to serve the public, and I am particularly grateful to Mr. ALEXANDER E. ORR, Mr. CHARLES STEWART SMITH and Mr. WILLIAM E. DODGE for the gracious remarks which they were good enough to make at the time when the Chamber voted to bestow upon me this medal. It will be treasured by my children as the most precious possession which will descend to them, and be regarded by them, as it is by me, as the crowning honor of a long career, which, by this action of the Chamber of Commerce, is brought to a happy ending. [*Great Applause.*]"





### APPENDIX III.

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OPINIONS OF THE APPELLATE DIVISION  
UPON THE APPLICATIONS TO THE SU-  
PREME COURT AND OF THE COURT  
OF APPEALS UPON THE CON-  
STITUTIONALITY OF THE  
RAPID TRANSIT ACT.



APPLICATION  
FOR THE BROADWAY ROUTE.

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OPINION OF THE APPELLATE DIVISION.

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SUPREME COURT, APPELLATE DIVISION, FIRST DEPARTMENT, MARCH, 1896: CHAS. H. VAN BRUNT, *P. J.*, GEORGE C. BARRETT, WILLIAM RUMSEY, PARDON C. WILLIAMS, GEO. L. INGRAHAM, *JJ.*

IN THE MATTER

OF

The Application of the BOARD OF RAPID  
TRANSIT RAILROAD COMMISSIONERS for  
the CITY OF NEW YORK, for the appointment of Commissioners, etc.

Motion to confirm Report of Commissioners appointed by the General Term of the Supreme Court to determine and report whether the railway determined upon by the Board of Rapid Transit Commissioners ought to be constructed and operated.

MR. A. B. BOARDMAN & MR. E. M. SHEPARD *of counsel* for the motion.

MR. ELIHU ROOT, MR. FRANKLIN BARTLETT, MR. GEORGE ZABRISKIE, MR. G. C. DE WITT, MR. J. A. MURRAY, MR. EZRA A. TUTTLE, MR. J. E. ROOSEVELT and MR. J. C. BUSHBY *of counsel* opposed.

VAN BRUNT, *P. J.*:

The Board of Rapid Transit Commissioners having adopted a route and general plan, and having failed to obtain the consent of

the property owners along the line of the proposed railways, made application to the General Term for the appointment of commissioners as provided for in the Rapid Transit Act (Laws 1891, chap. 4, and the various acts amendatory thereof); and on the 15th of November, 1895, the General Term appointed three commissioners to determine and report after due hearing, whether the railway determined upon by the said Board and mentioned in its petition ought to be constructed and operated. These commissioners having proceeded with the hearing of the matters referred to them, on the 6th of March, 1895, reported to this court that they were of the opinion and thereby determined and reported that the route proposed by the Board of Rapid Transit Commissioners ought to be adopted, and that the railway determined upon by said Board ought to be constructed and operated.

The Commissioners after spending months in the taking of testimony in regard to the question of the cost and the manner of building and operating the railroad in question, and having frankly stated in their report that any conclusion which they could arrive at in respect to the probable cost would be mere conjecture, seem to have cut the Gordian knot by setting aside entirely the question of cost, and looking upon the questions referred to them solely as engineering problems. It is the first time, we think, in the history of any great enterprise that the question of practicability did not include the consideration of cost. More than eighteen hundred years ago it was said: "For which of you, intending to build a tower, sitteth not down first, and counteth the cost, whether he have sufficient to finish it? Lest haply, after he hath laid the foundation, and is not able to finish it, all that behold it begin to mock him, saying, this man began to build, and was not able to finish." (St. Luke, chap. 14, verses 28, 29, 30.)

If the question of cost was not to be considered by these commissioners, it is difficult to see what question was before them. The legislature and the people had both spoken very emphatically upon the question of the desirability of rapid transit; and it is well known that there is no problem which engineering science cannot solve provided there are dollars enough behind it to meet the expense.

But it is urged upon the part of the movers of this scheme that the property owners cannot raise the objection as to cost, because

they have no interest in the determination of that question. It is apparent that this is a fallacy. The only justification which can probably be urged to sustain the interference with the use and access of abutting owners to their property which the construction of this railroad will necessarily involve, is that it can and will be completed within a reasonable time after its commencement. If there is a probability that financial difficulties will be met, and the construction of this road will drag its weary length along for a time which no man can compute, and possibly its construction be absolutely abandoned because of the wreck of the city's finances and the intervention of constitutional prohibitions, it is manifest that great injury will result to the property of abutting owners for which they can never be compensated.

In reaching the conclusion arrived at the commissioners appointed by this court seek to justify themselves by reference to the language of the General Term when a former scheme of rapid transit was before it. In so doing they seem to have lost sight of the fact that the plan now seeking our sanction differs in every feature from the one which was then before the court. In the case formerly before the General Term, all that it was necessary for the commissioners to do to protect the city and the abutting owners, was to take such security as would enable the city to fill up the hole made in the course of the work in case the contractor failed to comply with his contract. The court was of the opinion that the question was simply a financial one, and that it might safely assume that the commissioners would take sufficient security at least to put the street in its then present condition in case of the failure of the contractor, to complete the work, and that if capitalists would at their own risk undertake the enterprise, they should be allowed to do so. In the case at bar, however, the problem is absolutely different. It is the city's money which is to be spent. And it is to be observed that in view of the obligations already incurred by the City for work in progress it is difficult to see how money can be provided to meet even the engineers' estimates of the cost of this work, in consequence of the constitutional prohibition against the creation of debt, and if this work was commenced it would be impossible for the city to raise funds necessary for its completion, and the work must cease although incomplete and absolutely useless.

It may be said, and it is said, that it is to be presumed that the commissioners will take sufficient security from the party contracting with the city to construct this railway upon its behalf. But if our commissioners cannot tell whether this railroad can be constructed for \$50,000,000, or \$90,000,000 after spending months in investigating this subject—as they have reported—upon what basis are the Rapid Transit Commissioners to fix the security? It has been also suggested that the increase in the value of property will give an enlarged opportunity to create a debt, but this increase will be a matter of time, and the contracts for construction must be made now, the obligation must be entered into *now*, and it cannot be done in sections, consequently the debt limits can only be considered as they now exist.

It is to be observed that the moneys for the enterprise must be furnished by the city, the risk is really that of the city, and it would seem, having in view the other obligations of the city unless the road can be built for a substantially less amount than the engineers' estimates, that the work must stop and the city would not have the right to borrow money enough to put the streets in the condition in which they were before it had sunk its fifty odd millions of dollars in a vain attempt to carry out this scheme of rapid transit. If our commissioners are unable to ascertain within \$40,000,000 what this enterprise is to cost would it not be the height of folly to enter upon this construction, knowing as we do that without any exception the cost of every great public work has far exceeded the estimate of the engineers? We have, for example, the Brooklyn Bridge—estimated cost \$8,000,000,—actual cost \$16,000,000; the New Aqueduct—estimated cost \$14,000,000—actual cost \$24,000,000, with from \$6,000,000 to \$8,000,000 more of claims which the aqueduct commissioners had incurred, but which the city escaped the payment of only because of the prohibitory character of the legislation on that subject. We have no reason to assume that the Rapid Transit Commissioners will be more careful of the public interest than were the Croton Aqueduct Commissioners.

In a great work like the one proposed it is impossible to foresee all contingencies, and as the Rapid Transit Commissioners have averred their intention to go as far as the debt limit will allow in the making of their building contract, there will be no question

but that the boundary will be overstepped because of the very nature of the enterprise. Besides by the terms of the act, the city is bound to indemnify the contractor against many and divers things as to the expense of which no estimate can be given.

The act provides that the city shall secure and assure to the contractor the right to construct and operate, free of all rights, claims or other interference, whether by injunction, suit for damages, or otherwise, on the part of any owner, abutting owner or other person,—a condition absolutely impossible of fulfillment. How is the city to prevent interference with the work by injunction? That question lies with the courts; and not with the courts of this State alone, for there are cases without doubt in which the courts of the United States would have jurisdiction to act, and when such jurisdiction exists they have not hitherto shown much reluctance in acting.

The Rapid Transit Commissioners have no power to fetter the action of the courts, and they have no right to deprive the contractor of this provision of the law, by any restrictions in the contract.

That legal proceedings will be undertaken which will to some extent at least interfere with the progress of this work seems to be inevitable; and if delayed by these, which the city cannot prevent, the contractor might be relieved from his contract with the work half performed, and the city have no recourse against his sureties.

There is no restriction upon the Rapid Transit Commissioners as to the amount they can render the city liable for,—a power never before given to any board or body,—and they may involve the city in an amount of obligation which would absolutely ruin and destroy its credit, and bring about as great a disaster as was occasioned by the collapse of the Panama canal, and all other public improvements would necessarily be stopped.

It has been suggested that under the provisions of Section 34 of the Rapid Transit Act, added to Chapter 4 of the Laws of 1891, by section 9 of Chapter 752 of the Laws of 1894, and thereafter amended by Chapter 519 of the Laws of 1895, the Board of Rapid Transit Commissioners is empowered to contract for the construction of the whole road, or all the roads provided for by their plans in a single contract, or may by separate contracts, executed from

time to time, provide for the construction of parts of said road or roads, or for the construction at first of two or more tracks over a part of such road or roads, and afterwards of one or more additional tracks over a part or parts of such road or roads, as the necessities of said city or the increase of its population may in the judgment of said board require; and that under this power the Commissioners may delay the construction of sections of the road until the assessed valuation of the real estate of the city shall increase to such a sum as would allow the incurring of additional indebtedness upon the part of the city over and above that which is now permitted by the Constitution.

In respect to this suggestion it would seem to be sufficient to say that the subsequent provisions of the section in question appear to be inconsistent with the right to make entirely separate contracts, because they require that the contract of construction should also provide that the person, firm or corporation so contracting to construct said road or roads shall, at his or its own cost or expense, equip, maintain and operate said road or roads for a term of years to be specified in said contract. Hence, if the road is to be constructed in sections, there must be sectional provision in regard to operation, and the system would be anything but uniform and uniformity is an absolute necessity.

This necessity is contemplated by the provision subsequent to that first quoted, in which it is said that the Board may also in a contract for a part of such road insert a provision that at a future time upon the requirement of the Board the contractor shall construct the remainder or any part of the remainder of said road, as the growth of population or the interests of the city may in the judgment of the Board require, and may in such contract insert a provision of a method for fixing and ascertaining at such future time the amount to be paid to the contractor for such additional construction, and to the end of such ascertainment may provide for arbitration or for determination by a court of the amount of such compensation or of any other details of construction which shall not be prescribed in the contract, but which shall be deemed necessary or convenient by said Board. If this power is resorted to, the obligation is created at the time of the original contract, the ascertainment of its amount only being deferred; and hence it comes within the present prohibition of the Constitution.



It is to be further observed that the sectional plan assumes that the Board of Rapid Transit shall mortgage for a considerable period of years in the future the debt-creating capacity of the city. Under this scheme it would be impossible for the city to provide for the purchase of land, and for the building of public schools, the improvement of docks, the furnishing of additional water supply, and the establishment of additional parks—all improvements of a permanent character, payment for which may properly be provided for by bonds to be payable in the future—and the city would lie helpless, bound hand and foot by this octopus of debt created by these rapid transit contracts.

It will undoubtedly be claimed that this is an exaggerated picture of the situation, but the disposition seems to be to enter upon this enterprise regardless of and in utter ignorance of the cost, trusting to the distant future to help the enterprise out of the difficulties by which it is admittedly surrounded. This blind confidence we are unable to endorse, in face of the adverse finding of our commissioners as to what we think is the crucial fact governing the disposition of this case. They say, after examining the question of cost, that any estimate they could make would be very like conjecture.

With these facts staring us in the face—these results almost certain to ensue—how can it be said that this enterprise ought to be commenced? The probabilities indicate that after sinking \$51,000,000 in it without being able to complete it, the enterprise would have to be abandoned since no legislation could afford any relief, “All that beheld it would begin to mock, saying, This city began to build and was not able to finish.”

The motion should be denied.

ALL CONCUR.

RUMSEY, *J.*:

In the examination of the questions presented in this proceeding, it must be conceded that some system by which people may be rapidly and conveniently transported from one extremity of the City of New York to the other, is desirable and would be convenient. Such is the judgment of the Legislature as evidenced by the statute pursuant to which this proceeding is taken,

and fortified by the judgment of the common council of the city. This conclusion is strengthened by the vote of the people to whom was submitted the question whether a system of rapid transit should be undertaken. It must be remembered though, that when the question was presented to the people the present scheme had not been devised and that the plan upon which the people expressed their minds was very much different from this one, involving a different route, a different system of construction and a very grave difference in the liability which the city should assume. The vote of the people therefore on that subject, while it may be construed as an approval of some scheme of rapid transit, is not to be taken as an adoption of the particular scheme which is presented here.

Laying aside all constitutional questions, the matter is presented to us in a purely business aspect. The situation of this city is such that healthful and convenient places of residence which are within the reach of persons of moderate means can be secured by them only in the upper portion of the city, and at a great distance from the places of business of many of them. The proposition is to devise some practicable scheme by which these people may be transported conveniently, safely, rapidly and at small expense, from their homes in the extreme upper portions of the city, to their places of business at the lower end of the city, and it is believed that such a scheme if it can be operated, will enhance the wealth of the city and increase largely its desirability as a place of residence. It is manifest that to carry this scheme into effect it is necessary that some means should be devised by which the whole length of the city shall be traversed. It will not do to terminate the proposed road at any point short of the upper limits of the city, because it is there only that room can be found for the dwelling places of those who are most interested in the adoption of this scheme, and for whose convenience it is principally intended. The numerous systems already in operation are sufficient for the transportation of those whose places of residence are below the upper limits of the city, and while those systems are not sufficiently commodious to permit the passengers who are carried by them to travel conveniently at all hours of the day, yet they are undoubtedly sufficient for the absolute needs of the community in the central portion of the city.

Therefore no system of rapid transit will be useful or meet the wishes of the people, unless it shall traverse the whole city and connect one end with the other.

Such being the requirements, the first question is, what is the city at liberty to do by way of meeting the necessities of the case? The duty of the authorities in that regard is laid down clearly by the statute. In the first place it is the duty of the city to construct such a system of rapid transit; to appropriate and raise the necessary money to put it in condition for operation at least, whatever the expense may be; to acquire the fee of such land as may be necessary to erect power houses and store cars, and for all other purposes of the proposed road; to acquire such privileges, terms and easements as the operation of the road shall make necessary, and to do this at its own expense. To that end, after some satisfactory plan shall have been devised, the Board of Rapid Transit Commissioners, representing the city, is required to make a contract with some corporation or individual by whom the railroad thus planned shall be completed. This corporation after having completed the road is to operate it for a term of not less than thirty-five years, with a contract for its renewal from time to time indefinitely. As has been said the city is to pay for the construction of this road. Not only that, but it is compelled by the law to provide in the contract that the city shall secure and assure to the contractor so long as the contractor shall perform the stipulations of the contract, the right to construct and operate the road as prescribed in the contract, "free of all right, claim or other interference, whether by injunction, suit for damages, or otherwise on the part of any owner, abutting owner or other person." (*Laws of 1891, Chapter 4, § 34 as amended by Laws of 1895, Chapter 519, § 10.*) This obligation on the part of the city is absolute and the extent of it is difficult to estimate. The Board of Rapid Transit Commissioners has devised a scheme for the construction of the road; has procured the consent of the common council of the city, and upon the failure to obtain the consent of a majority of the abutting owners upon the street through which it is proposed to build the road, has applied to this court to obtain its consent to build the road.

Right here it is necessary to determine what duty is laid upon this court and what considerations should affect it in concluding

whether or not its consent should be given. The statute says that, if the consent of the property owners cannot be obtained, three commissioners shall be appointed by this Court, and if they, after hearing interested parties shall report that such railway ought to be constructed or operated, their report when confirmed by this court, shall be taken in lieu of the consent of property owners. (Sections 4, 5). Manifestly the duty of the court is to consider whether the railway proposed should be constructed. This duty is not merely formal and perfunctory. It involves inquiry into all the facts and requires a consideration of grave questions of expediency and public policy. (*Matter of Kings County Elevated Railway Company*, 82 N. Y., 95.) We are not permitted to examine into the advisability of any general scheme of rapid transit for the expediency of that has already been decided upon. We are to say whether upon all the facts made to appear before us, the scheme presented is feasible and within the limit of the power of the city, and so likely upon the whole to be for the benefit of the city that the railway should be constructed in spite of the refusal of the property owners to give their consent. That consideration involves an examination into the nature of the scheme; the time probably necessary for its construction; the probable cost; whether or not the expense is within the means which the city has at hand to pay, and whether upon the whole, considering all the advantages and disadvantages presented, the particular scheme is one which it is within the power of the city to carry into effect, having in view other imperative calls upon the city treasury and which when carried into effect, will be likely to afford the advantages which are expected from such a construction. In this consideration we are to throw out the question of profit to the city. By the terms of the contract the city is not expected to receive any profit from the operation of this road. The benefits which it must derive are entirely consequential and such as arise from the increased convenience to great numbers of its inhabitants, and the probable enhancement of values in property in certain portions of the city. The only money which the city is at all likely to get directly from the operation of the road, is the annual interest upon a certain portion of the bonds, which it is required to issue, and one per cent. per annum in addition for a sinking fund to be payable after a cer-

tain time. It is quite clear that the sum to be paid to the city will not recompense it for the interest upon the bonds which it is to issue. Those bonds are to bear interest at the rate of three and one-half per cent. per annum. The rental is to be estimated, not upon all the bonds which shall have been issued, but upon such of them as shall be left after deducting the bonds which shall have been issued to pay for rights, terms, easements, privileges or property other than lands acquired in fee. So that it will be seen that the amount of bonds issued by the city will be very much larger than the total amount of those upon which the interest by way of rental shall be paid. In addition to that, must be considered the sum which the city may be compelled to pay by reason of its liability for interference and damages spoken of above, the amount of which cannot be estimated. It is quite true that the amount above mentioned is the minimum rental which can be exacted; but in view of the existing conditions it is clear that no greater sum can be obtained. Indeed since this case was argued, an amendment to the statute has practically authorized the Commissioners to contract for a less rental. For the same reason the one per cent. for a sinking fund to be paid on a portion of the bonds is certain to be very much less than one per cent. on the whole body of the bonds, so that the amount of the sinking fund will be very small in proportion to the whole amount of the bonds.

It is to be noticed too, that the contract provided for in the statute is so arranged that if the company defaults in its agreement to operate the road and the city is forced to take possession of it, it can never get, by means of the operation, anything more than the four per cent. upon the prescribed amount of bonds, and the one per cent. upon the sinking fund, because, by the express terms of the statute anything in addition to that above the expenses of the operation, is to be paid to the company and not to go to the benefit of the city. For that reason the element of the probable profit to the city in the building of this road, must be excluded from the calculation.

The plan as devised has in view an underground railroad, extending from Battery Place through Broadway to Fourteenth street thence dividing, one branch extending up Broadway and under the Boulevard to One Hundred and Eighty-fifth street, and on the east

side, extending from Fourteenth street through Fourth and Park Avenues to Mott Haven. It will be noticed that neither scheme has in view the extension at present of either branch of the road to the city limits, but each branch stops several miles short of them. This constitutes of course a serious defect, but not necessarily one by reason of which it could be said that the road ought not to be built.

The selection of a plan for an underground railroad cannot be complained of. The engineers seem to agree that it presents no insurmountable engineering difficulties, although a railroad constructed in that way will undoubtedly cost very much more than one built upon the surface of the ground. But the Rapid Transit Commissioners have concluded that upon the whole, taking into consideration the fact that a road so constructed when finished will not be liable to interruption; will be entirely free from danger of collision with vehicles; will leave the street above open and can be operated at high speed with comparatively few inconveniences, the advantages of it more than compensate for the increased cost and probable delay in construction.

It is undoubtedly true and it seems to be conceded, that a road thus constructed will not be as convenient in some respects for passengers, and certainly will not offer as many attractions to them as one built upon or above the surface of the ground, but it must be remembered that such a road is built for use and not for the enjoyment of the passengers, and if it would serve its purpose in affording means of rapid transit from one end of the city to the other, the minor inconveniences can well be borne.

We must bear in mind, however, that this underground road is to be constructed along the busiest street in the city of New York, which constitutes the main highway of the city; which is constantly thronged with vehicles and foot passengers; which is lined with costly buildings, especially at its lower end, the rental value of which is very great and that this construction will undoubtedly require a considerable time and that during that time passage and commerce upon this great highway will be seriously inconvenienced. It has been claimed that in fact the street will be practically closed during the time that the railroad is constructing. It is stated by the engineer of the railroad company that a mode

of construction can be adopted which will prevent that calamity, but the fair inference from his testimony is that if such a mode of construction is adopted the cost of the road will be increased by a very large amount of money, so that upon the whole it seems quite improbable that, having in view the amount which is at the disposal of the city, it would be practicable to use those means in the construction of the road which would be necessary to enable the foot passengers and vehicles to go up and down Broadway while the excavation was going on under them. If this be true, and it is fairly to be inferred from the evidence, it would follow that while the road was in process of construction, the business done upon this street would be very seriously diminished and of course that would cause a very great loss both in the business profits and in the rental value of buildings to the people whose places of business lie along that street. When it is remembered that the evidence is that it will require upwards of three years, working night and day, to complete this road upon this plan from Battery Place to Fourteenth street, and five years to complete it to Thirty-fourth street, it will be seen that the amount of this loss is hardly susceptible of computation. This of itself, of course, is no reason why the road should not be built, but it is a matter to be seriously considered in deciding whether it should be built or not.

It appears from the testimony that the construction of this road to Thirty-fourth street will, under the most favorable circumstances occupy not less than five years, if built in the manner proposed. This involves a loss of interest of several million of dollars, and adds very largely to the necessary cost of the city in completing the enterprise, not to mention the considerations of the inconvenience to which the inhabitants of the city, and especially of the business men, upon the street along which it is to be built, will be put. The length of time must also be considered because of the possibility that the contractors may not be able to finish the road at all and the city may be left with an unfinished road upon its hands, and with its great thoroughfare practically destroyed for use.

But the most serious question is that of cost. We do not agree with the counsel for the Board of Rapid Transit Commissioners that this is a matter with which the court has no concern. As we have seen, in conclusion whether this road ought to be built, we must

take into consideration all the facts and the matter of its expediency and also the question of public policy. Such is the determination of the highest court of the State, and in the consideration of those questions the probable expense to which the city will be put is an important if not a decisive factor. The question has never been presented to the court upon any other application. All other street railroads have been built by private corporations. The matter of cost to them was a mere matter of profit or loss. If they miscalculated, the result was simply that the road was left unfinished and that some other company could be organized to go on and finish it. There was no limit to the amount that might be expended, except the limit of possible profit. Whether the work was done or not, no great public inconvenience could result because the necessity of restoring the street so far as it was rendered impassable by the work, was a matter of small moment, and a thing which could easily be provided for. In this case the conditions are very different. The cost is to be incurred by a municipal corporation, which is not at liberty to expend an unlimited amount of money or to incur unlimited obligations. Its right to incur obligations is limited by the constitutional prohibition and its capacity to raise money is controlled by the necessary expenses of the municipal government and by the unwillingness of the people to endure oppressive taxation. If there should be a miscalculation in the cost so that the contractors would be unable to finish the road, or to comply with the terms of their contract, the city would have no remedy except to insist upon the forfeiture and the guaranty bond which the statute provides. As every one knows, such things in such an exigency would be but a broken reed and it would be almost certain that the city would be compelled either to permit the work to be unfinished or to pay the expense of finishing it by direct taxation, in view of its inability to borrow money after it had reached the constitutional limit of its indebtedness. No careful business man would undertake any enterprise under these circumstances, unless he had counted seriously the cost of the enterprise and had become satisfied of his ability to meet the expense whatever it might be.

It is quite true that the statute permits the Rapid Transit Commissioners to contract for the construction of a part of this rail-



road at one time, and does not compel them to provide by a single contract for the finishing of the whole road. But it is not to be supposed that the Board would take advantage of this provision unless it were absolutely necessary to do so, because the scheme only becomes useful when it shall be fully completed and it is quite clear that an underground railroad extending only through the lower portion of the City of New York, and having close competition with the surface roads, which during the greater portion of the day are of more than sufficient capacity to carry the passengers, would be a complete failure; and if they do decide to build the road in sections, none the less must they incur the whole obligation when the contract is first made. However much the construction of the road may be delayed, the question is whether the whole road shall be constructed, and not whether the court shall give its consent to the construction of a portion of it. While we must, and do assume that the Board of Rapid Transit Commissioners will do what, in its judgment, is best for the interest of the city, yet we must also assume that they will proceed as rapidly as possible to the construction of this road for the whole length, for which it is planned, and when our consent is given it is with the understanding, of course, that that is what is intended.

In considering this question of cost, the first thing that impresses us is that after all the investigation which the court commissioners made upon the subject, they were entirely unable to come to a conclusion as to the probable expense. In view of the extremely contradictory nature of the testimony and of the fact that the scheme itself has not been sufficiently worked out to enable the engineer having it in charge to say precisely what the expense of it will be, that is not at all strange. But the effect of it is to require us to examine the more carefully into the case and conclude whether there is any reason to believe that this road, or so great a portion of it as would be of advantage to the city by the expenditure of any sum which the city can pay, can be constructed. We have examined with care the testimony upon this subject. We are met at the first with the fact that the whole scheme as presented for our consent is tentative; that the details are not worked out; that even the mode of making the excavation which is by far the greater portion of the expense, is not entirely settled upon. As

to many of the questions which should be answered to enable the cost to be estimated with any accuracy, we are left entirely in the dark. For instance with regard to the amount of the underpinning and shoring of buildings which may be necessary in the lower part of Broadway, there is a serious and distressing conflict of testimony which would indicate that the matter has not been examined with sufficient care. This single item may add hundreds of thousands of dollars to the expense of this excavation. Indeed, the cost of the excavation itself is entirely unsettled; in the nature of things it cannot be settled. That cost depends of course upon the depth at which this tunnel is to be run, and that depends upon the depth below the ground at which the tracks are to be laid, and the disposition which is to be made of the constructions now existing in the street. As we understand the testimony, the depth at which the tracks are to be laid beneath the street is not settled, and the plan presented is only tentative and liable to be changed if any change should be discovered in the conditions which have been supposed to exist. This change may add largely to the expense of the road. There are many other considerations from which it appears that the probable expense of this road has not yet been estimated with any approximation to accuracy. In examining the testimony upon this subject we find that the lowest estimate is that made by the engineer of the Rapid Transit Commissioners. That estimate is something over \$49,700,000. The estimate of the board of experts, which is furnished to us for the construction of the road between the same points, is \$50,000,000. On the other hand we have the estimate of Mr. O'Rourke who says that in his judgment the cost of the road, excluding the interest upon the construction, will be something over \$79,500,000. While we cannot adopt this last estimate in all its entirety, yet a careful comparison of it with the other two estimates satisfies us that it is worthy of consideration and that the actual cost is likely to be much greater than that estimated by the consulting engineer of the Board. Indeed, that is the history of all great public and private enterprises, no matter how carefully planned or how honestly carried out. It needs no reference to particular instances to satisfy every intelligent man that architects' and engineers' estimates of any work, whether building a house, constructing a railroad or an aqueduct or any great

public improvement, are always sure to largely fall short of the actual and necessary cost.

But assuming that the cost of this enterprise shall be only that which is estimated by the engineer for the Rapid Transit Commissioners, that amounts in round numbers, to \$50,000,000. He makes no estimate for the payment of damages; for the expense of acquiring property in fee for the incidental uses of the road, nor does he make as indeed he could not make, any estimate whatever for the contingent liability of the city arising out of its requirement to agree to secure and assure to the contractor the right to construct and operate the road, free of all right, claim or other interference, whether by injunction, suit for damages or otherwise, on the part of any owner, abutting owner or other person. The extent of that liability may be something appalling. It cannot be estimated but it must be taken into consideration in coming to a conclusion whether upon the whole the city ought to undertake a work, carrying with it the possibility of such serious financial burdens. If, however, as we said we take simply the estimate made by the consulting engineer and add to that the \$5,000,000 of bonds which must be issued to pay for the acquisition of property as provided by Section 37 of the Act, there at once arises the necessity of issuing upwards of \$55,000,000 of bonds. It is plain that the city is not now in a situation to incur any such indebtedness. The assessed valuation of the city is something over \$1,646,000,000. The actual debt now existing, not including outstanding obligations is something over \$109,000,000. The limit of the constitutional power to incur indebtedness is \$164,600,000, leaving as an amount of indebtedness which the city may incur above its present indebtedness, \$55,000,000. But we are bound to know that outstanding obligations have consumed a considerable portion of that amount. The bonds which the city must issue for obligations already incurred, is upwards of \$19,000,000, which would leave only \$36,000,000 that could be issued for this purpose. It is conceded on all hands that such a sum is entirely insufficient for the completion of this work. But if even that amount of bonds should be issued, thus bringing the indebtedness of the city up to its full limit, there is no doubt that the results might be quite serious. From that time on all expenses, however onerous, could

be met only by taxation. In whatever public enterprise it should be necessary to engage, from any unforeseen exigency which might arise, there would be no power to incur any indebtedness however useful the existence of such a power might be. If it should be necessary to build school houses or to improve the water front, or to repave a street, each of those things could be done only upon condition that the money to pay for it should be at once raised by taxation. The serious consequences of such a condition of affairs can easily be understood. The actual necessity of leaving some margin of the power to incur indebtedness so that the city may provide for unforeseen emergencies, must be conceded, and the propriety of undertaking any enterprise which would take away that power must be questioned seriously. But if as is quite possible, the work should prove considerably more expensive than the estimates, the consequences would be much more serious. In that case undoubtedly the work must stop, or it could be continued only by a resort to direct taxation to pay for it, which added to the necessary taxation for the expenses of the city government, might be exceedingly oppressive. If taxation should not be resorted to, the necessary result would be that the work would come to an end and probably the money already invested would be totally lost.

It may be said that this is altogether too sombre a view to take of this affair, but the answer is as has already been said, that the history of such enterprises is uniform in showing that the estimated cost always falls short of the actual expense of construction, and in looking at a business matter a wise business man will always take into consideration the most unfortunate condition that might occur, in order that he may be prepared for whatever shall happen. If it be said that the natural increase of values in this city will be such as within no long time to permit a great increase in its debt, the answer is that we are dealing and must deal, with existing conditions. The necessity of contracting indebtedness goes hand in hand with the increase in the power to do so. When one examines into the propriety of engaging in any enterprise which will not yield him a substantial profit, such as this one is he should consider not what may possibly occur in the future, but what is the present condition of affairs, and whether that condition will warrant him in incurring the liability which he is about to assume. Any en-

terprise which might, or even may, seriously impair the credit of this city or heavily burden the tax payers, is not to be undertaken without grave misgivings. An extraordinary exigency must exist to justify the authorization of any such thing. In our judgment that exigency does not exist with reference to this road.

While the convenience of a system of rapid transit must be conceded, and while it cannot be denied that the desire for it has been expressed by the municipal authorities and by the people, yet in view of all the considerations which have been presented to us, we are of the opinion that it would not be proper for us to consent that the city shall undertake the building of this road upon this particular plan at this time, in view of the fact that the road when built will not furnish a complete system of rapid transit from one end of the city to the other; that it is doubtful whether any large portion of it can be built with the money now at the disposal of the city, and that it is certain that the expenditure of the vast sum of money even now authorized by the Legislature, will take away the power of the city to engage in any other public work, however necessary; and may possibly so impair its credit that it will not be able to recover in the course of many years.

MOTION DENIED. (5 App. Div. 290.)



APPLICATION FOR THE  
ELM STREET ROUTE IN 1897.

OPINION OF THE APPELLATE DIVISION.

SUPREME COURT, APPELLATE DIVISION, FIRST DEPARTMENT, DECEMBER, 1897: CHAS. H. VAN BRUNT, *P. J.*, WILLIAM RUMSEY, PARDON C. WILLIAMS, EDWARD PATTERSON, GEORGE L. INGRAM, *JJ.*

IN THE MATTER

OF

The Application of the BOARD OF RAPID  
TRANSIT RAILROAD COMMISSIONERS for  
the CITY OF NEW YORK, for the appoint-  
ment of three Commissioners, etc.

Motion by the Board of Rapid Transit Railroad Commissioners of the City of New York to confirm the report of Commissioners.

ALBERT B. BOARDMAN and EDWARD M. SHEPARD, for the motion.

GEORGE ZABRISKIE and CEPHAS BRAINERD, Jr., opposed.

VAN BRUNT, *P. J.*:

The imperious necessity of improved means of transit in the city of New York has long been recognized. It had become so evident that in the year 1892 the people determined that, as there seemed

to be no other means for its accomplishment, it should be brought into existence even by the pledge of the credit of the city. This necessity seems to have addressed itself so strongly to the people that they considered that the accomplishment of this end should be attained though the ability of the city to carry on contemplated improvements might be thereby curtailed.

It has been said that the people have not by their vote approved of the plan now presented to the court, but another scheme, which differed in many of its characteristics from the plan now under consideration. I think, however, that a reference to the history of the rapid transit enterprise will show that the people did not give their vote to any particular detail by which rapid transit was to be obtained, but rather in favor of a result to be reached in any manner which might be found to be practicable.

The presentation of the plan now before the court, and the proofs and developments surrounding it, constitute striking evidence of the correctness of the conclusion of this court in condemnation of the previous scheme which was submitted to it. This plan, however, calling as it does for an expenditure of from \$20,000,000 to \$40,000,000 less than the scheme presented to the court before, still involves grave questions of law as to the possibility of its completion.

The report of the Supreme Court commissioners concedes, and the arguments of counsel in favor of the application seem to admit, that if the total cost of the building of the proposed rapid transit road is to be deemed as incurred by the city at the time of the making of the contract, and there is added to this all the indebtedness of the city of New York then existing, whether funded or contingent, and its obligation to assume, on the first day of January of the coming year, the indebtedness of the adjacent cities and counties, as provided by the new charter, the limit of indebtedness will be exceeded. Whether any of these elements can be excluded in determining as to the legality of any contract which the rapid transit commissioners might make or propose to make for the building of this road, presents serious questions of law which in my judgment ought not to be determined upon this application, for the reason that if the court on this application should come to a conclusion upon these questions adverse to the legality of such proposed



contract, no review could be had of its determination, although involving only questions of law.

It is stated in the report of the Supreme Court commissioners that the suggestion that no contract for the construction of the road can be made without *ipso facto* creating a debt to the full extent of its estimated cost is not reasonable. The question of the reasonableness of a constitutional inhibition is not open to discussion, and an examination of the authorities in this State upon the question of what constitutes indebtedness or debts due may show that this unreasonable proposition has very respectable authority, viz., our Court of Appeals.

It cannot for a moment be assumed in considering these questions that independent and separate contracts of construction with different contractors could, from time to time, be entered into, for the reason that every contract of construction must necessarily embrace a contract for the operation of the line by the constructing contractor, and to have the operation of the rapid transit system controlled by divers and various operators would of itself necessarily absolutely condemn the scheme. It would seem, therefore, that the contract initiating the work must also contain provisions for its completion and final operation. It is proposed by deferring construction and payment to throw (as it is stated) the indebtedness into future years, and thus obviate the constitutional objection.

It is further urged that a considerable amount of the apparent indebtedness of the city of New York is only imaginary and not real; that, for example, assessment bonds are outstanding which it is anticipated will, in the future, be paid by the receipt of assessments for the benefit levied upon neighboring property; that lands acquired for Croton Aqueduct purposes, which are to be used only for sub-surface constructions, may be sold for nearly what was paid for them, and that indebtedness thus reduced, and that the excess of indebtedness of the adjacent cities and counties over the limit provided by the Constitution is not to be charged against the city at this time, because the actual assumption has not taken place, although the obligation to assume at present exists. Whether these devices in respect to the contract, and these theories as to the existing indebtedness of the city, will finally obtain, ought to depend

upon the decision of our court of last resort, and should not be determined, as has been already stated in this proceeding, where they cannot be reviewed.

There are other questions in regard to other species of indebtedness. We know, for instance, little, if anything, from the evidence before us, of the floating indebtedness of the territory which the city of New York is bound to assume on the first of January next. These uncertainties may, upon some application in reference to the contract, be cleared up, so that the exact truth in respect thereto may be known.

Upon the whole, although it is evident that beyond peradventure the entrance by the city into this enterprise will materially cripple its power to carry on other contemplated improvements (unless the money therefor is produced by immediate taxation), and although weighty questions of law must necessarily arise as to the legality of any contract which may be entered into for the construction of this road, I think that as the cost of construction is established with reasonable accuracy, and the ability to meet such cost is shown, provided the position of the Supreme Court commissioners and the rapid transit commissioners in respect to what constitutes the indebtedness of the city under the Constitution finally prevails, whatever may be our opinion upon those subjects, we should confirm the report of the Supreme Court commissioners and allow these legal questions to be settled in the future, particularly as, if it should be determined that the debt limit was exceeded by any contract which the commissioners might make, no liability could possibly be imposed upon the city. (*Litchfield v. Ballou*, 114 U. S. 190.)

In view of the magnitude of the undertaking which we are asked to approve, and the vital interest which the city has in the prompt completion of the contract for the building of the road when entered into and its effective equipment, maintenance and operation, we think that we should, before consummating our confirmation of the report of the Supreme Court commissioners by the entry of an order to that effect, have some assurance that the powers of the rapid transit commissioners in respect to security provided by section 34 of the Rapid Transit Act (Laws of 1891, chap. 4, as amended by Laws of 1895, chap. 519) to be taken by them for the payment of the rental specified in the contract and for the faithful perform-

ance of all the conditions, covenants and requirements provided for in the contract, should be exercised so as to protect the interests of the city in a substantial manner; and to that end a stipulation should be filed by the rapid transit commissioners that the penalty of the bond specified in section 34 of the Rapid Transit Act will be fixed at not less than \$15,000,000. This amount, in view of the large interests of the city involved in its advances of credit for the work as it progresses, is not more than sufficient security to the city in the event of the failure of the contractor to perform his or its contract, and to enable it to carry the road to completion and equip the same in case the enterprise is thrown on its hands by the default or forfeiture of the contractor.

Upon the filing of the stipulation referred to in the foregoing opinion, an order will be entered upon the usual notice confirming the report of the Supreme Court commissioners.

RUMSEY, WILLIAMS and PATTERSON, *JJ.*, concurred; INGRAHAM, *J.*, dissented.

INGRAHAM, *J.* (dissenting):

The question to be determined by this court upon this application is presented on a motion to confirm the report of commissioners who have determined that an underground railroad ought to be constructed upon or under certain streets in the city of New York, notwithstanding the refusal of a majority of the property owners upon such streets to consent thereto.

Prior to the year 1874, it was for the Legislature to determine whether a road should or should not be built. Whatever the rule had been as to roads or highways where the public had only acquired an easement, it had become the settled law of this State that where the fee of a street or avenue had been acquired by a municipal corporation to be used as a street or avenue, the Legislature had the exclusive power to determine when such street or avenue should be used for the construction and operation of a railway. Neither the municipal corporation, in whom was vested the fee of such street or avenue, nor the owners of property abutting thereon, were required to be consulted as to the construction or operation of such a road. At the general election in 1874, an amendment to the Con-

stitution, radically limiting the power of the Legislature to grant such franchises, was adopted by the people and became a part of the fundamental law of the State; and that provision was in substance continued in the new Constitution adopted by the people in the year 1895. (*N. Y. Const.* art. 3, § 18.) The Legislature was prohibited from passing a private or local bill granting to any corporation, association or individual the right to lay down railroad tracks, with a further provision that "the Legislature shall pass general laws providing for the cases enumerated in this section, and for all other cases which, in its judgment, may be provided for by general laws. But no law shall authorize the construction or operation of a street railroad except upon the condition that the consent of the owners of one-half in value of the property bounded on, and the consent also of the local authorities having the control of that portion of a street or highway upon which it is proposed to construct or operate such railroad, be first obtained, or in case the consent of such property owners cannot be obtained, the Appellate Division of the Supreme Court, in the department in which it is proposed to be constructed, may, upon application, appoint three commissioners, who shall determine, after a hearing of all parties interested, whether such railroad ought to be constructed or operated, and their determination, confirmed by the court, may be taken in lieu of the consent of the property owners."

Here, for the first time, was recognized the right of owners of property upon a street to be consulted before that street should be used for railroad purposes; and the Legislature, being prohibited from passing a special law granting that power, was also prohibited from passing a general law under which such right could be acquired, unless there was a provision that the consent of the property owners should be obtained for the use of the streets or avenues for the purpose of such a road. But it was recognized that an occasion might arise when the public interests in the construction and operation of a railroad in certain streets or avenues would be so great as to overshadow the wishes or whims of the property owners upon the street or avenue and to present a case where the rights of individuals must give way to the public interest; and provision was made in such a case for the appointment of commissioners, who were to hear all the parties interested, take the evidence offered, and determine,

after hearing all objections offered for or against the construction of the road, whether it ought to be constructed and operated. As was said by Mr. Justice RUMSEY, when the report of the commissioners of 1896 was before the court: "We are to say whether, upon all the facts made to appear before us, the scheme presented is feasible and within the limit of the power of the city, and so likely upon the whole to be for the benefit of the city that the railway should be constructed in spite of the refusal of the property owners to give their consent. That consideration involves an examination into the nature of the scheme; the time probably necessary for its construction; the probable cost; whether or not the expense is within the means which the city has at hand to pay; and whether, upon the whole, considering all the advantages and disadvantages presented, the particular scheme is one which it is within the power of the city to carry into effect, having in view other imperative calls upon the city treasury, and which, when carried into effect, will be likely to afford the advantages which are expected from such a construction." (*Matter of Rapid Transit R. R. Commissioners*, 5 App. Div. 300.)

The commissioners, after hearing the parties interested upon this application, have determined that this road ought to be constructed and operated; and upon us devolves the duty of saying whether that report should be confirmed.

In determining whether a great work should be undertaken, the first question which must be considered is as to the financial ability of those upon whom will fall the obligation of providing the money required, and the power or authority of the contracting parties to make the necessary contracts. Unless there is an affirmative determination of that question, it is the height of folly to attempt to make a contract, or to attempt to proceed with the work. And on this application, considering the nature of the work proposed and the fact that the municipal corporation of the city of New York is required to make the contract and to furnish the money to pay the cost, we must first consider, in determining this application, as to whether the city has the power to make the proposed contract and the ability to furnish the necessary money. We have not to determine whether a private individual should be allowed to construct a work, which it is conceded would be of great public utility,

out of his private means, and where all that is required for the protection of the public is to see that proper security is given to make it certain that the contract will be completed. There the question of the limit of cost is only material upon a determination as to how much security will be required, or the nature of such security. Where, however, the money is to be furnished by the public, whether by the State or by a municipal corporation, a different question is presented. And this becomes especially important when the State officers or the municipal corporation are limited, either by the Constitution or by law, as to the amount of indebtedness that can be imposed upon or incurred by the authority or municipality which is to make the contract or to be responsible for the cost of the undertaking. It does not seem to me to require argument to show that if the incurring of such a liability, or the making of a contract which will involve a liability of a municipal corporation largely in excess of that which the municipality has the power to incur—in other words, if, because of the fundamental law of the State, a contract to build the road when made by a municipal corporation would be absolutely void, because such contract would impose upon the municipality a liability in excess of that allowed—it is the duty of the court to refuse its approval of a report recommending that the road which would require the making of such a contract should be built. If the obligation on the part of the city to pay the amount which is to be paid for the doing of the work is void, it is apparent that the contract never could be performed and that no advantage would result from the making of the contract, either to the city or to those interested in having the public work completed. A city which has incurred indebtedness to the limit of the amount allowed by the Constitution is absolutely helpless to provide means for the payment of any new obligations imposed upon it, except by a resort to taxation; and even this power of taxation is limited by the same section of the Constitution which limits the power of municipal corporations to borrow money. The liability of the municipal corporation to creditors, whether upon binding contracts and obligations of the city, or upon claims against the city which arise from the neglect of its agents in the performance of their duties, or whether imposed upon the city in any other manner, still exists; and those obligations must be met, or the city itself

becomes bankrupt; and its whole taxing power must be used to supply the money necessary to meet such obligations, imposing upon all the property of the city burdens appalling to contemplate, and for which no advantage derived from means of communication between different parts of the city could possibly be a compensation.

Providing that the city had power to contract, the construction of this railroad would impose upon the city, not only the cost specified in the contract, but other indefinite and uncertain liabilities, the amount of which no one has attempted to estimate, and which it seems to me cannot be ascertained until after the road is built and in operation. Thus, by section 34 of this act (Chap. 4, Laws of 1891, as amended by chaps. 528, 752, Laws of 1894, and by chap. 519, Laws of 1895), it is provided: "Such contract shall further provide by proper stipulations and covenants on the part of the said city, that the said city shall secure and assure to the contractor, so long as the contractor shall perform the stipulations of the contract, the right to construct and to operate the road as prescribed in the contract, free of all right, claim or other interference, whether by injunction, suit for damages or otherwise, on the part of any owner, abutting owner or other person." By section 37 of the act amended as aforesaid, it is provided: "For the purpose of providing the necessary means for such construction at the public expense of any such road or roads, and the necessary means to pay for lands, property, rights, terms, privileges and easements, whether of owners, abutting owners or others, which shall be acquired by the city for the purposes of the construction or the operation of such road or roads as hereinafter provided, and of meeting the interest on the bonds in this section hereinafter provided for accruing thereon prior to the completion and readiness for operation of the portion of such road or roads for the construction of which such bonds shall have been respectively issued, the board of estimate and apportionment, or other local authority in said city in which such road or roads are to be constructed, having power to make appropriations of moneys to be raised by taxation therein, from time to time, and as the same shall be necessary, and upon the requisition of said board of rapid transit railroad commissioners, shall direct the comptroller, or other chief financial officer of said city, and it shall thereupon become his duty to issue the bonds of said city."

This liability, to be imposed upon the city by the contract to be made by the rapid transit railroad commissioners, is without limit as to amount. Just what are the rights of the owners of property abutting upon a street or avenue, the fee in and to the soil underneath the surface of which has been acquired by the city of New York, so far as the same is not required for the ordinary city uses of gas or water pipes, or others of a like character, has never been finally determined. We have now the example of the elevated railroad, constructed and operated in the city of New York under legislative and municipal authority for nearly twenty years, which has been compelled to pay many millions of dollars to abutting property owners for the easement in the public streets appropriated by the construction and maintenance of the road, and still the amount that the road will have to pay is not ascertained. What liabilities will be imposed upon the city under this contract; what injury the construction and operation of this road will cause to abutting property, and what easements and rights will have to be acquired before the road can be legally constructed and operated, it is impossible now to ascertain. Yet these charges must be met by the city, and if the city has no power to borrow money to pay them, it must either realize the money necessary from taxation, or default in the payment of its obligations. It seems to me clear that, to justify our approval of the construction of this road by the city, we are bound to inquire as to the effect of the imposition upon the city of the obligations which will be created by the execution of this contract, upon the general financial condition of the city, and if there is any serious doubt as to the power of the city to provide money to meet the obligations which will be imposed by the contract, together with the money necessary to provide for the efficient government of the city, it is our duty to refuse our consent. With whatever regret we may be compelled to stop an improvement which is one ardently desired, the duty imposed upon us is one which we must perform by a conscientious exercise of judgment regardless of consequences.

It is well here to call attention to the fact that the situation has materially changed since this act was passed by the Legislature, and since the people of the present city of New York voted in favor of the construction of this road by the municipality. Since that time what is known as the Greater New York charter has been



passed, creating a new municipality, upon which will devolve the responsibility of providing the means for the construction of this road and those necessary to meet all the engagements imposed upon the city by the contract to be executed by the rapid transit commissioners. By the charter of this new municipality (Laws of 1897, chap. 378), which takes effect January 1, 1898, there is created a greater city, in which are united the present city of New York and a territory largely exceeding that of the present city. Such new city is declared by the 1st section of the Greater New York charter to be "the successor corporation in law and in fact of all the municipal and public corporations united and consolidated as aforesaid, with all their lawful rights and powers, and subject to all their lawful obligations, without diminution or enlargement except as herein otherwise specially provided." By section 4 of this charter it is provided: "All valid and lawful charges and liabilities now existing against any of the municipal or public corporations or parts thereof which by this act are made part of the corporation of the said The City of New York, including the county of Kings and the county of Richmond, or which may hereafter arise or accrue against such municipal and public corporations, or parts thereof, including the said counties of Kings and Richmond, which but for this act would be valid and lawful charges or liabilities against the same, shall be deemed and taken to be like charges against or liabilities of the said city of New York, and shall accordingly be defrayed and answered unto by it to the same extent and no further than the said several constituent corporations would have been bound if this act had not been passed. All bonds, stocks, contracts and obligations of the said municipal and public corporations, including the county of Kings and the county of Richmond, and such proportion of the debt of the county of Queens and of the town of Hempstead as shall be ascertained as hereinafter prescribed, which now exist as legal obligations, shall be deemed like obligations of the city of New York, and all such obligations as are authorized or required to be hereafter issued or entered into shall be issued or entered into by and in the name of the corporation of the city of New York." By section 5 of the said charter it is provided: "All the valid debts of the municipal and public corporations mentioned in the first section of this act, including the county of Kings and

the county of Richmond, and the proportion of the debt of the county of Queens and of the town of Hempstead aforesaid, and the valid debts of the towns, incorporated villages and school districts herein united and consolidated with the corporation heretofore known as the mayor, aldermen and commonalty of the city of New York, into The City of New York, as well as the debts of the latter corporation, shall be the common debt of The City of New York as hereby constituted. \* \* \* It being the intent hereof that the obligations and liability of The City of New York as the successor of municipalities and public corporations consolidated into it shall be the same as and not otherwise or greater than the respective obligations and liabilities of the several constituent corporations, and that The City of New York shall succeed to all of their rights as well as to their obligations and liabilities in respect thereof, except as herein otherwise specially provided." And by section 8 of the act it is provided: "In consideration of the foregoing provisions, whereby The City of New York, as hereby constituted, assumes as aforesaid the valid debts, obligations and liabilities of the municipal and public corporations, including the counties, towns, incorporated villages and school districts as aforesaid, and to carry out the scheme and purpose of this act, all of the public buildings, institutions, public parks, water works and property of every character and description, whether of a public or private nature, heretofore owned and controlled by any of the said municipal and public corporations or parts thereof, hereby consolidated into The City of New York, including any and all such property owned by the county of New York, the county of Kings and the county of Richmond, wherever situated, and by the county of Queens situated in that portion thereof which is included within the limits of The City of New York as constituted by this act, and all the right, title and interest of the said municipal and public corporations and counties as aforesaid, or any of them, in and to such property, are hereby vested in The City of New York and divested out of the said corporations and counties, and the power of said municipal and public corporations and of the said counties of New York, Kings and Richmond to become indebted, shall cease upon the consummation and taking effect of the consolidation herein provided for."

We have, therefore, on the 1st day of January, 1898, a public municipal corporation to come into existence, upon which is imposed the liability for all indebtedness and obligations of the various counties, municipalities, towns and villages of the territory therein incorporated; and, in consideration of the imposition of these liabilities upon the new municipal corporation, the right of the people in the various portions embraced within its limits to conduct their own affairs and to dispose of the property of the corporations formerly existing, is taken away and vested in the new municipal corporation. So far as this new municipal corporation is affected, this act imposes upon it the obligations and indebtedness of these various existing corporations and municipalities, and the liability of the new city for any contract or obligation made by either of the cities or municipal or other corporations embraced within the territory of the greater city, must be limited by the power of this greater city to assume such obligations, or by the power of the Legislature to impose them upon the new city on the 1st day of January, 1898, when this consolidation goes into effect.

The people of the State have expressly limited the right of municipal corporations to incur indebtedness, as they have limited the right of the Legislature to impose indebtedness upon them. "No county or city shall be allowed to become indebted for any purpose or in any manner to an amount which, including existing indebtedness, shall exceed ten per centum of the assessed valuation of the real estate of such county or city subject to taxation." (Const. art. 8, §10.)

It is difficult to conceive of a more absolute prohibition of indebtedness, above the limit named, than is provided for by this section of the Constitution. No city or county is to be allowed to become indebted for any purpose, or in any manner, to an amount which, including existing indebtedness, shall exceed ten per cent. of the assessed valuation of the real estate of such county or city subject to taxation, and all indebtedness in excess of such limitation, except as it existed at the time of the adoption of that provision, "shall be absolutely void." Thus, neither the Legislature nor the officers of the municipal corporation, nor the people residing in such county or municipal corporation, in their corporate capacity, could make any obligation or incur any indebtedness that could be bind-

ing upon the municipal corporation when such obligation carried the total indebtedness of the city above the limit imposed; and the only exception recognized by the section is that it shall not be construed to prevent the issuing of certificates of indebtedness or revenue bonds issued in anticipation of the collection of taxes for amounts actually contained or to be contained in the taxes for the year, when such certificates or revenue bonds are issued and payable out of such taxes, nor to prevent the issue of bonds to provide for the supply of water. In order, however, that there could be no evasion of the prohibition by the issuance of such certificates in anticipation of taxes or obligations for a water supply, it was provided that all such certificates and indebtedness not retired within five years after their date of issue, bonds issued to provide for the supply of water, and any indebtedness incurred by any portion or part of a city, should be included in ascertaining the power of the city to become otherwise indebted. Thus, under the express provisions of this article, when this charter takes effect, all certificates of indebtedness issued in anticipation of the payment of taxes, which have not been retired within five years after their date, and any debt incurred by any portion of the greater city to provide for a supply of water, and any debt incurred by any portion or part of the city for any purpose, shall be included in ascertaining the power of the new city to become otherwise indebted.

What is meant by the term "indebtedness" as contained in this provision of the Constitution? "Ordinarily, it imports a sum of money arising upon a contract express or implied. In its more general sense it is defined to be that which is due from one person to another, whether money, goods or services; that which one person is bound to pay or perform to another." (5 Am. & Eng. Ency. of Law, 143.) In construing the meaning to be given to such a term as "indebtedness" in the Constitution, we must consider the object sought to be attained by this provision of the Constitution under consideration. "The mischief to be prevented was the creation of an excessive debt for local improvements or public works, or the loaning of municipal credit, so payable that the burden should not fall upon those who contracted the obligations or on their revenues, but on posterity." (*Bank for Savings v. Grace*, 102 N. Y. 318.)

Here we have a provision for the purpose of preventing either a municipal corporation or the Legislature from incurring indebtedness beyond a certain limit. Is it not clear that such provision could only be effectual by construing the term "indebtedness" to mean any obligation or liability required to be discharged by the payment of a sum of money? This word "indebtedness" has received its construction by the Supreme Court of the United States in the case of *Litchfield v. Ballou* (114 U. S. 190). It seems that in the Constitution of the State of Illinois there is a provision that "no county, city, township, school district or other municipal corporation shall be allowed to become indebted in any manner or for any purpose to an amount, including existing indebtedness, in the aggregate exceeding five per centum on the value of the taxable property therein," the language being almost identical with that in use in the Constitution of this State now under consideration. The Supreme Court of the United States, in construing this provision, says: "It (the city) shall not *become indebted*. Shall not incur any pecuniary liability. It shall not do this in *any manner*. Neither by bonds, nor notes, nor by express or implied promises. Nor shall it be done for *any purpose*, no matter how urgent, how useful, how unanimous the wish. There stands the existing indebtedness to a given amount in relation to the sources of payment as an impassable obstacle to the creation of any further debt, in any manner, or for any purpose whatever. If this prohibition is worth anything, it is as effectual against the implied as the express promise, and is as binding in a court of chancery as a court of law."

In the case of *Berlin Iron Bridge Co. v. City of San Antonio* (62 Fed. Rep. 882) the same construction was given to a provision of the Constitution of the State of Texas, and it was held that a contract to build a bridge, made by a city, by which the city obligated itself to pay a sum of money for the building of such bridge, created a debt, and that such contract was not binding upon the city, being prohibited by the Constitution of the State of Texas, which provided that no debt shall ever, at any time, be created by any city, except upon certain conditions which were not complied with in the execution of the contract in question.

The same question was presented again in the Supreme Court of the United States, in the case of *Lake County v. Rollins* (130 U. S. 662). There it was held that a prohibition contained in the Constitution whereby no county should contract any debt by loan, in any form, except for certain purposes, was in fact a limitation upon the power of the county to contract any and all indebtedness, and the same principle has been applied in construing the provisions of the Constitution of the State of Illinois (see *City of Springfield v. Edwards* 81 Ill. 626; *Prince v. City of Quincy*, 105 id. 138, 215; id. 443; *Culbertson v. City of Fulton*, 127 id. 30), and also by the Supreme Court of Iowa in the cases of *Grant v. City of Davenport* (36 Iowa, 396) and *City of Council Bluffs v. Stewart* (51 id. 385).

In the case of *Leggett v. The Bank of Sing Sing* (24 N. Y. 284) it was held that the words "debt due" included the contingent obligation of an indorser of a promissory note held by a bank, although the note itself was not due and the liability of the indorser was only contingent upon the failure of the maker of the note to pay it. The court was unanimously of the opinion that the words "debt due" would include an obligation that existed, although it was contingent and not payable until a future time. Judge STORY, in the case of *Carver v. Braintree Mfg. Co.* (2 Story, 450), says: "It seems clear that in common parlance, as well as in law, the term (indebtedness) is, in an enlarged sense, sometimes used to denote any kind of a just demand."

In *Smith v. City of Newburgh* (77 N. Y. 132) a statute was under consideration, which gave certain power to the water commissioners of the city of Newburgh to acquire property for a water supply, but provided that if the said commissioners "at any time deem that the interests of said city call for and require the expenditure of money exceeding the sum of ten thousand dollars in enlarging, altering and improving the water works of said city, or for any of the purposes of this act, before any such enlargement or improvement shall be entered upon or any contract or purchase relating thereto shall be made," the same should be approved at a special election to be held in the manner provided for by the act in question. The water commissioners of the city of Newburgh leased a parcel of land for a term of twenty years at an annual rent of

\$1,500 for the first ten years, and \$2,100 for the next ten years, payable semi-annually, with the privilege to the city to purchase the property at \$30,000 at any time during the term. It was held that the lease was void, as the obligation exceeded the sum of \$10,000, and was not authorized by the vote of the taxpayers provided for by the statute. MILLER, J., in delivering the opinion of the court, says: "The rents in all would amount to \$36,000; the purchase price, if made at any time during the term, to \$30,000, so that, in no contingency was a less sum than \$10,000 to be paid by the city. That the rent was distributed for a long period of time, and to be paid semi-annually, did not lessen the amount. The whole liability was incurred upon the execution of the lease, and the common council undertook to bind the city for an amount exceeding \$10,000, in direct violation of section five, last cited." It was further held that no subsequent ratification of an illegal act can bind a corporate municipality where a contract is unlawful when it is made, and that no subsequent act could make the contract effectual.

Would the city of New York, upon executing this contract to pay \$35,000,000 at various times within five years from the date of the contract, become indebted for any purpose, or in any manner? I think it clear that it would. The indebtedness would not be immediately payable. It might be a liability which would be contingent upon the contractor's complying with his contract, but it is clear that it would be an obligation upon the city on the date when the contract was executed, payable, it is true, at certain specified times in the future, but still an existing obligation of the city to pay that sum upon the contractor's completing the work as called for by the contract. And is not such a liability or obligation to pay just as much an indebtedness as if evidenced by a bond payable twenty years from date? This provision of the Constitution would be of no effect in limiting the power of a city to incur indebtedness, unless this meaning were given to the word "indebtedness." I think, therefore, that no contract can be made, or obligation entered into, or liability incurred by any municipal corporation in this State, calling for the payment of a sum of money which, with existing debts, obligations or liabilities of every kind and description, will impose upon the municipal corporation an

obligation to pay, either at present or in the future, an aggregate sum of money exceeding ten per cent. of the assessed valuation of the real estate subject to taxation embraced within the limits of such municipal corporation at the time the contract or obligation is made or assumed, and that the new city of New York will have no power to make any contract or obligation which will or can increase its debt above this limit.

As before stated, the obligation upon the city of New York, under the contract that these rapid transit commissioners must make to build this railroad, is to some extent indefinite. It will have to pay the amount provided for in the contract for the building of the road. What that amount will be no one can tell until the contracts are made. We have the opinion of the engineers, which is confirmed by that of the commissioners, that the railroad can be built for \$35,000,000 or less; but whether contractors can be found to build it for that amount does not appear. Assuming, however, that a contractor can be found who will build the road for that amount, the obligations to be imposed upon the city of New York are not confined to the specific amount to be paid to the contractor, but, in addition, the city is to be compelled to acquire all real estate that the board of rapid transit commissioners shall determine to be necessary for the purpose of constructing or operating the road, "including necessary stations and station approaches, or for the purpose of operating or securing the operation of the same free of interference and right of interference and of action and right of action for damages or otherwise, whether by abutting owners or others, or to provide, lay or maintain conduits, pipes, ways or other means for the transmission of electricity, steam, water, air or other source or means of power, or of signals or messages necessary or convenient for or in the construction or operation of such road, or for the transportation of materials necessary for such construction or operation, or to provide a temporary or permanent way or course for any such conduit, pipe or other means or source of transportation." (§39 of chap. 4 of the Laws of 1891, as amended by chap. 519, Laws of 1895, §15.) And in addition to the amount necessary to acquire such land, the city is at all times to guarantee the contractor freedom from any obligation by unauthorized suit for damages, or otherwise, on the part of any



owner or abutting owner, or other person, that would prevent him from operating the said road as constructed under the contract. The amount of this contingent liability imposed upon the city, in addition to the amount required to be paid for the construction of the road, is incapable of being definitely ascertained, and no reasonable estimate can be made as to its amount; but the city will be required to pay therefor. (Chap. 519, Laws of 1895, §20.) Accepting the report of the commissioners that the road, as proposed, and of which our approval is asked, can be built for the sum of \$35,000,000, a liability for that amount will be imposed upon the city, in addition to the amount that will be needed for stations and other real estate acquired in fee, and also the amount necessary to acquire the easements of those whose property will be injured by the construction and operation or maintenance of the road; and upon the execution of the contract these various sums will become an existing indebtedness of the city and county of New York, and, as such, will be imposed upon the new corporation to come into being upon the 1st day of January, 1898.

The question then comes, would such an indebtedness, taken with the indebtedness which must be assumed by the said new municipal corporation, be in excess of that for which such new corporation can become indebted, under the provisions of the Constitution before cited? In discussing the amount of the indebtedness which under the new charter, will be imposed upon the new city of New York, we must bear in mind that it is impossible to ascertain the full amount of the obligations of the various municipal corporations, counties and other political subdivisions included within the territory which will constitute the new city. There is nothing before us to show what obligations or liabilities, absolute or contingent, have been incurred by these various municipalities and corporations. There was before the commissioners evidence as to certain existing obligations and liabilities which, under the provisions of the new charter, would become obligations or indebtedness of the new city, but it is clear that there are obligations or liabilities other than those specified. It is also clear that the prohibition of the Constitution against indebtedness is entirely irrespective of the resources of the municipality to pay such indebtedness. An amount of money which a municipal corporation is bound

to pay is not any the less an indebtedness because it is to be paid in return for property to be transferred or acquired by the corporation which will produce a revenue for the corporation. There can be no doubt that the city of New York, with its sinking fund for the payment of principal and interest of its debts and its power of taxation, will be able to pay as they become due all of its obligations or indebtedness. But a debt that a corporation or an individual is bound to pay is no less a debt or obligation, because such person or corporation has the means to pay the debt when it becomes due, and where a municipal corporation is prohibited from incurring a debt, it is as much prohibited from incurring one which it can pay as one which it cannot pay. The Constitution says that the city of New York shall not be allowed to incur any indebtedness exceeding the limit fixed, and that any indebtedness exceeding that limit, assumed or attempted to be imposed upon such corporation, shall be absolutely void. It is not at all material, as to the power of a corporation to enter into a contract by which it obligates itself in the future to pay a sum of money, to show that in the future, relying upon the growth of the city and the increase in the value of assessments, when that sum of money becomes due the limit will be so raised that it would then be able to incur the indebtedness. The prohibition applies to the present time, and prevents the creation of an obligation to pay in the future a sum of money when by such an obligation the total amount of its indebtedness exceeds ten per cent. of the assessed valuation of the real estate included within the corporate limits subject to taxation at the time when the indebtedness was sought to be incurred. The opinion of the comptroller and the finding of the commission that within the next few years the present city of New York would, if it continued to exist, be able to incur an indebtedness of \$135,000,000 without exceeding the constitutional limit, is no answer to the objection that by the last assessment of property subject to taxation within the city, the proposed contract would increase the indebtedness above ten per cent. of such assessed value of taxable property. Nor are we justified in eliminating all present contracts and obligations of these municipalities which have been entered into and which will call for the payment of large sums of money for public improvements now under way. Such contracts and obligations are

present liabilities of the city payable in the future, and constitute indebtedness of the city as much as this proposed contract would be an indebtedness if it were executed. What we must do is to ascertain what the indebtedness of the new city of New York will be on January 1, 1898, and then determine whether or not this proposed increase of indebtedness will be valid within the constitutional prohibition; and unless we can see that such a contract would not increase the debt to such an extent as to bring the total debt of the city in excess of the requirements of the Constitution, I think it is our duty to say that this road should not now be built.

The consolidated stock and certificates of indebtedness of the present city of New York, deducting the certificates of indebtedness issued in anticipation of taxes, and the gross amount of the obligations of the city held by the sinking fund, *i.e.*, the net funded debt on August 31, 1897, appears to have been \$130,412,895. In addition to that, it appears from the testimony of the comptroller that balances due or to grow due upon contracts for public improvements made by the city of New York, unpaid on August 31, 1897, amount in the aggregate to the sum of \$20,185,675.80. There must be further added to the obligations of the city the amount which the city will be compelled to pay for a large amount of real estate taken by the city, the most of which has actually been taken possession of, and the value of which is now being determined. The evidence as to the value of this property is, of course, indefinite, and the actual amount that the city will be required to pay is not easily to be ascertained. The commissioners, in their report, estimate the amount to be \$10,000,000, but it would seem that the amount which the city will have to pay will be much larger than that, and will undoubtedly exceed \$20,000,000. We have thus for these three items an aggregate city debt of about \$170,000,000. It appears, however, that the city has on hand, as the proceeds of bonds sold, and which it is claimed is included in the amount stated as due on account of these contracts and this obligation for lands taken by the city and also in the amount of the funded debt, the sum of \$9,901,763.49. Assuming that this should be deducted from the aggregate amount of indebtedness shown, there is a total indebtedness of \$160,696,807.31. In addition to this total existing debt, which is clearly a present existing liability of the city, as appears

from the testimony of the comptroller, there are bonds and stocks of the city which had been authorized by the board of apportionment and other city authorities, and on August 31, 1897, he was required to sell an aggregate of \$16,038,792.50. How far these bonds have since been issued does not appear. Under the law as it then stood, however, these bonds or obligations were required to be issued and the proceeds applied to the purposes specified, and the comptroller could be compelled by a judicial proceeding to sell such obligations for the purposes specified; and, from a description of the objects for which the bonds were to be issued, it seems that a large portion, if not all, of this sum is required to meet actual existing obligations of the city, which will have to be met by money procured in some way by the city. It also appears that there are other liabilities for the opening of streets, proceedings to acquire the title to which are now pending; liabilities of the city upon claims made against it for damages sustained in consequence of the closing of streets, and other like claims, which aggregate several millions of dollars. Leaving out of consideration, however, these liabilities of the city, which are somewhat indefinite, and the amount of which it is impossible to fix, we have, as before stated, upon the three items of indebtedness specified, after deducting the amount of money held by the city realized from the sale of bonds which is included in the indebtedness, and which will be applicable to the payment of the amount due upon the contracts or other obligations specified, a total net debt of the city of New York of \$160,696,807.31. Ten per cent. of the assessed valuation of the real estate of the present city subject to taxation is \$187,708,679. Deducting the total debt as above indicated, of \$160,696,807.31, shows that the present city has no power to incur an indebtedness in excess of \$27,000,000, and that is without considering any of the liabilities above specified, the amount of which cannot be accurately determined from the evidence before us, but which evidently imposes upon the city liability for a large amount.

As before stated, we are not now concerned with the amount of property which the city has wherewith to pay its indebtedness, or the money it will receive which is applicable to that purpose. Indebtedness has no relation to the assets of the debtor. A debtor's assets has relation to his solvency or ability to pay his debt; but no

matter what the assets of a municipal corporation may be, no matter what its resources, the value of its property, or the amount on hand applicable to the payment of the indebtedness, its indebtedness is what it owes—what it can be compelled to pay to creditors—and when a municipal corporation is restricted by law as to the amount of debts which it may incur, that restriction is not affected by the fact that it has or will have assets sufficient to pay its debts. The Constitution declares any indebtedness incurred in excess of the limit imposed by law absolutely void, no matter what the financial condition of the city, no matter what its resources, no matter what its power of payment.

It is hardly necessary to discuss the claim made by the counsel for the commissioners, that if the city found itself without means to pay for this rapid transit road it could sell its parks and school houses, police station houses, and property used for its fire department. For, even assuming that it would be for the advantage of the city to destroy the public parks, abandon the police and fire departments, and its system of free education, it is by law required to provide this machinery for the government of the city, and these parks and schools for the well-being of its inhabitants.

We have now considered the amount of the debts of the present city of New York, and have seen that, assuming that the report of the commissioners is correct as to the cost of this proposed road, an indebtedness for such cost would exceed the present power of the city to incur indebtedness. Turning to the condition of affairs upon the consolidation, which will take place upon the 1st of January, 1898, it appears that the amount of indebtedness which the new city can incur will be considerably less than the amount which the present city of New York can become indebted for. It is impossible to ascertain from the evidence before the commissioners just what the indebtedness of the new city will be. It is conceded, however, that the city of Brooklyn has reached the limit and has no power to incur any additional indebtedness. In addition to this, the debt of the county of Kings, which exceeds \$14,000,000, becomes a part of the indebtedness of the new city; and all the debts of Richmond county and the various towns and villages in that county, and a portion of the debt of Queens county, and the debts of the various municipalities, towns and villages in Queens

county embraced within the new city of New York are to be assumed by the new city. Considering the funded debt of the territory embraced within the new city of New York, without counting the other liabilities of the counties, cities, towns and villages we then find that the total assessed valuation of real property within that territory subject to taxation amounts in the aggregate to \$2,448,149,794. The funded debt of the city of New York is \$130,412,895. The funded debt of the city of Brooklyn is \$50,965,593. The funded debt of the county of Kings and towns annexed to Brooklyn is \$18,701,508. The debt of the county of Richmond and of the towns and villages therein is \$3,082,660, and the debt of the county of Queens and of the cities and towns therein annexed aggregates \$11,328,754, making a total aggregate of \$220,491,410. This amount, deducted from that for which the new city of New York can become indebted, leaves a balance of \$24,323,569; and this balance, as above stated, is without considering any of the liabilities upon contracts executed before January 1, 1898, and for property taken for public use, and allowing nothing for any of the various claims that have been made against the several cities and municipalities within the greater city of New York. The amount of legal liability of the present city of New York, outside of its funded debt, is much more than this amount. It is certain that an addition to the present indebtedness of the existing counties and municipal corporations of the amount called for by such a contract as is contemplated for the building of this road would make the obligation of the Greater New York far in excess of the amount of indebtedness which the Legislature could impose upon the new city under the provisions of the Constitution before cited. By the Greater New York charter a new municipal corporation is created, and, by the act creating it, a liability is imposed upon the corporation thus created. It seems clear that any act of the Legislature imposing upon such new municipality an indebtedness in excess of ten per cent. of the value of real property as assessed for taxation within the boundaries of the new city would be absolutely void, and would impose no obligation or liability upon the new city. By the act itself the old municipalities are destroyed. Their officers have either ceased to be officers in consequence of the expiration of their terms, or are by the new charter legislated out

of office, and no representatives of old municipal corporations will exist after January 1, 1898.

If the act of the Legislature, imposing a liability for these obligations upon the new municipal corporation, because of the fact that such liabilities exceed ten per cent. of the value of real estate as assessed for taxation, is void, a situation is created which certainly is most serious, the consequences of which it is impossible to conceive. Just what effect it would have upon the new charter, upon the validity of the whole scheme consolidating these cities, upon the liability of the several cities, towns and villages embraced within it, or upon the rights of creditors and bondholders, is most uncertain. But certainly the situation as suggested, considering the enormous interests involved, the enormous amount of property in question, and the confusion that would necessarily result from any doubt about the responsibility of the city, should make any public official, upon whom rests the responsibility of determining whether or not a new obligation should be created, hesitate before approving the imposition of such a new obligation.

I have come to the conclusion that the city of New York, as at present constituted, and the new city which will come into being on January 1, 1898, have no power to make a contract involving the payment of a sum of money which would be sufficient to construct this road; that such a contract would be in direct violation of the provisions of the Constitution, and would be absolutely void. If this is so, it seems to me clearly to follow that this court should not approve the building of this road, and that the report of the commissioners should not be confirmed.

With a sincere desire to approve of this report—a sincere desire to enable the means of rapid transit to be provided for the city of New York, which is ardently desired, and which is conceded to be so necessary for the future development of the city, I have been confronted by this provision of the Constitution which, to my mind, is an absolute bar to the contraction of an obligation for the payment of this sum of money by the city of New York to accomplish that purpose. It is needless to say that courts of law are bound to administer the law as they find it and, regardless of consequences, are bound to enforce the provisions of the Constitution. For this court to approve a plan which would involve a violation of

a constitutional provision by a municipality, upon the principle urged by the counsel for the commissioners, that if this is true no one will make a contract with the city, or because, if such a contract would be void, that question could be determined in some other proceeding, and some other court could stop the making of the contract or the building of the road, would be an evasion by this court of the duty imposed upon it by the Constitution, and a refusal of the court to perform such duty. The Constitution and laws of this State have imposed upon this court the obligation to determine whether this road should be built. In the performance of its duty the court must be satisfied that the road should be built by the city of New York under the conditions which were found to exist when the application for the approval was made. We cannot delegate the obligation of determining that question to any other tribunal. We can no more avoid the responsibility of making such a determination than we can relieve ourselves from the responsibility of determining any other question submitted, or justify a wrong determination of any question when it is inconvenient or disagreeable to perform the duty, upon the ground that an appellate court exists which will correct an erroneous decision of the question submitted to the court. The Constitution has not imposed this duty upon the Court of Appeals nor upon any other court or tribunal. If the execution of this proposed contract by the city of New York is illegal or if the contract is one which the city cannot make, and this plainly appears from the facts before us, and we still approve of it, so that the contract may be made, notwithstanding that its invalidity when made is conceded, it seems to me to be a plain violation by the court of its duty, and a refusal by the court to enforce the Constitution of this State, a duty which is expressly imposed upon every judge when he accepts the trust imposed on him by the people.

I am satisfied that, upon this record, a contract made by the city of New York to build this road by which the city undertakes to pay the cost, would impose upon the city an indebtedness in excess of that allowed by the provisions of the Constitution; that the contract would be absolutely void in its inception, and could never result in the building of any road called for by the plan before the commissioners, and that the making of such a contract, or the attempt to



build the road under its provisions, would result in nothing but disaster to the city of New York and to the property owners along the line of the road.

For these reasons, in my opinion, the report of the commissioners should not be confirmed.

Upon the filing of the stipulation referred to in opinion, order will be entered upon the usual notice confirming the report of the Supreme Court commissioners. (23 App. Div. 472.)




APPLICATION FOR REARGUMENT  
OR MODIFICATION.

OPINION OF THE APPELLATE DIVISION.

SUPREME COURT, APPELLATE DIVISION, FIRST DE-  
PARTMENT, FEBRUARY, 1898: CHAS. H. VAN  
BRUNT, *P. J.*, WILLIAM RUMSEY, EDWARD PATTER-  
SON, GEORGE L. INGRAHAM, *JJ.*

IN THE MATTER OF THE APPLICATION  
OF  
THE BOARD OF RAPID TRANSIT COMMIS-  
SIONERS.



Application upon the part of the Board of Rapid Transit Railroad Commissioners for reargument or modification, and application upon the part of certain property owners for the settlement of the order upon the decision of the Appellate Divisions heretofore rendered.

Mr. A. B. BOARDMAN and Mr. E. M. SHEPARD for the  
BOARD OF RAPID TRANSIT COMMISSIONERS.

Mr. GEORGE ZABRISKIE and Mr. CEPHAS BRAINERD, *Jr.*,  
for PROPERTY OWNERS.

VAN BRUNT, *P. J.*:

It is claimed upon the part of the Board of Rapid Transit Railroad Commissioners that the court had no power to require that cer-

tain conditions should be complied with prior to its giving its consent to the construction of the road by confirming the report of the Supreme Court Commissioners.

As the court has the authority absolutely to refuse to confirm that report for any reasons which might seem to it to justify such action, it is difficult to see why it has not the power to require that certain things shall be done which in its judgment are a necessary prerequisite to its confirmation of such report. It was the exercise of precisely this power by the Common Council and the General Term in 1884, when consents were given for the construction of the Broadway Surface Railroad below Fifteenth Street, which resulted in the present receipt by the city of a sum annually exceeding in amount the interest (at the rate at which the city borrows money) upon three or four times the then claimed value of the franchise; and the imposition upon the company of the obligation in respect to repairing the streets and keeping the same free from snow and ice. Prior to the confirmation of the report of its commissioners in that case, the General Term exacted the execution of an agreement upon the part of the corporation to conform to these requirements; and after the execution of such agreement, the report of its commissioners was confirmed. There would seem, therefore, to be no doubt in regard to the power of the court; and the only question remaining to be considered is as to whether there should be any modification in reference to the amount of the bond required by the original decision.

It is apparent upon an inspection of the application of the Board of Rapid Transit Railroad Commissioners that the security proposed to be taken by them is clearly inadequate to protect the city from the loss of a large part of the money it might advance towards the construction of the road in the event of the failure of the contractor to complete and equip the same.

It is suggested by the Board that the deposit by the contractor of \$1,000,000 in cash or its equivalent pursuant to the statute (which is to be returned to the contractor upon the construction and equipment of the road); the withholding of a reasonable percentage of the price of construction, to be paid to the contractor *only* upon completion and equipment; a bond or several bonds to secure construction and equipment but not rental, the total amount of such

bonds not to exceed \$7,500,000; a lien upon the equipment to be furnished by the contractor pursuant to the statute; and lastly, a bond under Section 34 of the Rapid Transit Act (Laws of 1891, Chapter 4 as amended by Laws of 1895, Chapter 519) in an amount which, with the cash value of the equipment shall be equal to the estimated rental for seven years, would be the proper security to be given by the contractor to the board.

It is apparent that the bond last mentioned, upon the basis suggested, would be a mere nominal bond. Assuming that the road could be constructed for \$30,000,000, as estimated by the board, the aggregate rental would not much exceed \$7,000,000; and as the cost of equipment would be from \$7,500,000 to \$12,000,000, there would be no excess of rental over the cost of equipment to make up the penalty of the bond.

In respect to the withholding of a reasonable percentage of the price of construction until completion and equipment, we are in no way informed as to what the commissioners think would be such reasonable percentage; and it will be apparent upon a moment's reflection that such a system of security is the most onerous to the contractor and of the least benefit to the city, that can well be devised; because it is requiring the contractor to put up security in cash, when, by the giving of a proper bond, he might attain the same object by credit. In respect to the city, the security would increase in proportion as the work progressed and would be the greatest when it would be least needed—namely, when the construction and equipment were completed; whereas the city needs the greatest protection from the failure of the contractor to carry out his contract of construction in its earlier stages.

The only other question that it is necessary to consider is as to whether the amount of the bond required by the Appellate Division is excessive. I think that it will be seen, when we consider the obligations of the contractor, that if he, after entering upon the work, abandons the contract, \$15,000,000 would be insufficient to put the city in the same position which it would have occupied had he completed the contract. The cause of such abandonment will only be for the reason that the cost of construction is much greater than the contract price which the city is required to advance; and the only way in which the city can receive any benefit

from the millions of money which it will have embarked in this enterprise, will be by the completing of the work itself--which will necessarily be at a cost to it, largely exceeding the contract price; and this difference the sureties upon the bond should supply.

Furthermore, the only money which the contractor is to put into the enterprise at his own risk, is that required for the equipment of the work after construction, upon which the city is to hold a lien to secure the provisions of the contract—which will then be those as to rent, maintenance and operation. It is estimated that this equipment will cost at least \$8,000,000. In the event of the failure of the contractor, and of the city being compelled to complete the construction, this equipment will also have to be furnished by the city, and the amount expended therefor will be chargeable against the bond. It is thus at once seen that the indemnity exacted is not only not excessive, but would not in reality save the city from loss in case of the failure of the contractor to complete, if it occurred in the early stages of construction. The \$7,000,000 of the bond remaining after providing for equipment, would undoubtedly be more than swallowed up by the increased cost of construction, if the city were compelled to complete.

It is undoubtedly true that the city will be largely protected as to rents, maintenance and operation, by the lien which is given to it by statute upon the equipment to be furnished by the contractor. But it is imperatively necessary that it should have adequate protection by way of security in the matter of construction and equipment.

There is no difficulty in the giving of a bond with several conditions and limited obligations. We are of opinion that the conditions of the bond should provide that \$14,000,000 of the bond should be conditioned upon construction and equipment; and that \$1,000,000 should be a continuing security, applicable to construction, equipment, rents, maintenance and operation; and that such bond may be executed by two or several persons or corporations, each bound for at least \$500,000 of the penalty, and justifying according to the statute.

We do not see how any adequate protection can be furnished to the city without the execution of security such as above required.

RUMSEY and PATTERSON, *JJ.*, CONCUR.

INGRAHAM, J.:

I dissent, upon the ground that the report should not be confirmed.

Application denied. Conditions of stipulation settled as stated in opinion. (26 *App. Div.* 608.)





APPLICATION FOR MODIFICATION  
OF THE STIPULATION.

OPINION OF THE APPELLATE DIVISION.

SUPREME COURT, APPELLATE DIVISION, FIRST DEPARTMENT, OCTOBER, 1899: CHARLES H. VAN BRUNT, *P. J.*, GEORGE G. BARRETT, EDWARD PATTERSON, GEORGE L. INGRAHAM, *JJ.*

IN THE MATTER OF THE APPLICATION  
OF  
THE BOARD OF RAPID TRANSIT COMMISSIONERS.

Mr. EDWARD M. SHEPARD and Mr. ALBERT B. BOARDMAN  
for the BOARD OF RAPID TRANSIT COMMISSIONERS and  
Mr. JOHN WHALEN, *Corporation Counsel*, for the application.  
Mr. GEORGE ZABRISKIE, opposed.

PER CURIAM:

The Corporation Counsel on behalf of the City of New York having joined with the Rapid Transit Commissioners in this application, and the municipal authorities as well as the Rapid Transit Commissioners having represented that in their opinion a bond of five million dollars will, in view of the form of the contract and the conditions under which the Rapid Transit Road is now to be constructed, amply protect the city, the Rapid Transit

Commissioners are relieved from the stipulation which they gave as a condition upon the confirmation of the report of the commissioners in approving of the construction of this proposed railway to the extent that a bond of five million dollars will be a compliance with the stipulation.

VAN BRUNT, *P. J.* :

I cannot concur with the majority of the court in the disposition of this application. While in view of the evidence produced of the difficulty of procuring a bond in the sum of fourteen million dollars to secure the performance of the proposed rapid transit contract so far as it related to construction and equipment, a reduction in the amount of such bond might be justified, yet it does not seem to me that in justice to the property owners such a reduction should be made as virtually to deprive them of the security which upon the original application was by this court deemed absolutely necessary for their protection and upon which the consent of the court was founded.

So far as the consent of the city authorities to the road is concerned, that in no way protects those whose interests the Appellate Division in passing upon this application is bound to protect.

The argument advanced that the security demanded is in excess of that which has ever been required in similar contracts, is of no possible weight; because there has never yet been a contract entered into presenting any of the peculiar features which are so prominent in the proposed Rapid Transit contract. While a ten per cent. bond might possibly be a reasonable security for construction, it is after construction is completed that the main burdens of the contractor begin; he is then for the first time required to invest in the enterprise his own money to the extent of over thirty per cent. of the entire cost of construction, and in order to secure this advance a bond of less than one-half the amount is required.

It is conceded upon the moving papers that the security required by the city of Boston upon its Subway contracts was twenty per cent., which would amount in the case at bar to a bond of from \$8,000,000 to \$10,000,000. The security required by the United States government is twenty-five per cent. amounting in the case at bar to a bond from \$10,000,000 to \$12,000,000; and no case

can be cited where a work of the remarkable character required by the contract in question is to be prosecuted, that it has been allowed to proceed upon the giving by the contractor of such grossly inadequate security as has now been determined upon.

It is to be observed that this peculiarity of the contract was the reason for fixing the bond at the amount mentioned upon the original application, and these conditions have not changed. After construction, the expenses of which are to be paid by the city, the contractor out of his own money is bound to equip and run the road, towards which latter expenditure the city is required to contribute nothing; and this agreed contribution must necessarily amount to \$8,000,000 or \$10,000,000—a feature which is entirely different from any contract which the city has ever entered into before or probably will be called upon to fulfill again. If the contractor fails in the performance of the contract, as was originally stated, it must be because the expenses of construction and equipment are greater than he anticipated, and the city must necessarily furnish the many additional millions required to complete and make the work useful. (44 App. Div. 636.)



THE SUN  
PRINTING & PUBLISHING ASSOCIATION

*vs.*

THE MAYOR, ETC.

OPINION OF THE COURT OF APPEALS.

IN THE COURT OF APPEALS, MARCH, 1897: CHARLES  
ANDREWS, *Ch. J.*, JOHN C. GRAY, DENIS O'BRIEN,  
EDWARD T. BARTLETT, ALBERT HAIGHT, CELORA  
E. MARTIN, IRVING G. VANN, *JJ.*

HAIGHT, *J.*:

This action was brought to restrain the rapid transit commissioners, the mayor, aldermen and commonalty and other officers of the city of New York from incurring any debt or obligation of the city under the Laws of 1891, chapter 4, as amended by the Laws of 1892, chapters 102 and 556; Laws of 1894, chapters 528 and 752, and the Laws of 1895, chapter 519, commonly known as the Rapid Transit Acts.

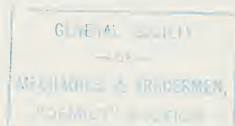
The acts, in brief, create a rapid transit commission and provide that the commissioners shall, in case they deem it necessary and upon the written request of the local authorities, proceed to locate a route and provide the plans and specifications for a railway through the city. That, after they shall have so located the route and provided the plans upon which the railway should be built, they may sell at public auction the right, privilege and franchise to construct, maintain and operate such railway; or, if the people shall determine by vote of a majority of the electors that such railway shall be constructed for and at the expense of the city, then the commissioners shall enter into a contract with any person,

firm or corporation best qualified in their opinion to fulfill and carry out the contract, for the construction of such road upon the route, and in accordance with the plans and specifications adopted. In case the road shall be built at the expense of the municipality, the officers of the city, upon requisition of the commissioners, are required to issue the bonds of the city, to the amount of \$55,000,000, payable in gold, with interest not to exceed three and one-half per cent., free from taxes, with which to pay for such construction. It is further provided that the commissioners may also enter into a contract with the contractors for the building of the road, for the lease and operation of the same for a period not less than thirty-five years, nor more than fifty years, at a rental agreed upon, to be not less than the interest on the sum paid by the city for the construction, and one per cent. in addition, and that the same may be renewed from time to time, as the lease shall expire, upon such terms as shall be agreed upon; that in case of default in paying the annual rental provided for, or in case of the failure or neglect on the part of the contractors to faithfully observe and fulfill the requirements of the contract, the city, by its rapid transit commissioners, may take possession of the road and equipments, and as the agents of the contractors, either maintain and operate the road at their expense, and upon their liability, or enter into a new contract with other persons for its operation. The acts also provide that in case the road shall be constructed by the municipality, it shall be and remain the absolute property of the city, and shall be deemed to be a part of the public streets and highways of the city, to be used and enjoyed by the public, upon the payment of such fares and tolls, and subject to such reasonable rules and regulations as may be imposed and provided by the board of rapid transit commissioners.

Pursuant to the provisions of these acts, the commissioners entered upon their duties, and upon the request of the authorities of the city of New York located a railroad to be built under the street through the main portions of the city, and then tried to induce private capitalists to undertake its construction. Failing in this, they submitted to the voters of the city the question as to whether the road should be constructed at the expense of the city, and a considerable majority thereof answered in the affirmative.

It is claimed that these acts are violative of the Constitution; that they are pernicious, wantonly extravagant and dangerous; that they tend to foster socialism and paternalism, and are a departure from our principles of government which has never before found favor. Upon this review we can only deal with the constitutional questions presented, but it will at once be seen that they are of grave importance, far-reaching in consequences, and not free from difficulty. We have given to their consideration careful study and serious reflection, hoping to reach a result that will afford necessary relief to the people of the city, and at the same time preserve the general policy of our system of government.

The Constitution (Article VIII. §10), among other things, provides that, "Nor shall any such county, city, town or village be allowed to incur any indebtedness except for county, city, town or village purposes." Is the building of the proposed railroad a "city purpose" within the meaning of this provision? We are aware that the expenditures of our city governments have become enormous, and that appropriations have been made for a great variety of purposes, many of which may be open to criticism, and that a complete definition of "a city purpose" may not be possible, in view of the fact that reasons may arise which we are unable to foresee or now consider. The authorities, in so far as they have spoken upon the subject, have only attempted a definition as to certain specified purposes. (*People ex rel. Murphy v. Kelly*, 76 N. Y. 475, 487; *In the Matter of the Mayor, etc.*, 99 N. Y. 569, 585; *In the Matter of the Niagara Falls & Whirlpool R. Co.*, 108 N. Y. 375; *Hequem-bourg v. City of Dunkirk*, 49 Hun, 550.) We shall not now attempt a definition, except in general terms, further than is necessary to determine the meaning of the acts which we have under review. Generally, we think, the purpose must be necessary for the common good and general welfare of the people of the municipality, sanctioned by its citizens, public in character and authorized by the legislature. Common highways have always been regarded as under the special care, supervision and control of municipal governments, upon which devolves the duty of keeping them in suitable repair as well as the duty of providing sufficient ways to satisfy the requirements and answer the convenience of the public. Highways are not only necessary for the welfare and convenience of the peo-



ple, but are required by them. They are public in character and authorized by the legislature. Under the civil law they belonged to the king; under the common law the king and his subjects have a right of passage over them, whilst the owner of the abutting land may possess the fee and the easements of light, air and access. In this state the common law is in force, but the sovereign power rests in the people. Highways have existed from earliest times. They were constructed for the passage of persons and the carriage of goods. They may consist of a path through a wilderness, a pass over a mountain or a broad street in a populous city. Formerly the chief transportation of freight and passengers on land was made with teams of animals. This necessitated improved ways, such as turnpikes and plank roads. In recent years railroads have been constructed and come into general use, so that now a very large percentage of the transportation of the country is done upon these roads. This is evident from the fact that, in the year 1893, 465,000,000 persons were transported over the railroads in the city of New York. These roads in this city are operated upon the streets; some are elevated, others are surface roads. They are all owned by individuals or corporations, but their service is public. They are not common highways in the sense that they are under the care and management of the municipality, but as to their purpose, which is the transportation of persons and property for the public, they are as distinctly highways as the ordinary street. It is true that a uniform fee is charged for persons taking passage over them, but this does not differentiate them from other highways; tolls were charged on turnpikes and plank roads, and yet they were public highways; nor does the fact that the road is occupied by rails in such a manner as to prohibit its use by teams and persons traveling on foot distinguish it from others, for highways are often constructed for different uses. There are ways for pedestrians, others for teams and vehicles, and still others for equestrians. If a highway may be constructed for these different uses, why may it not be constructed with rails upon which the millions may travel? In the case of the *Niagara Falls and Whirlpool Railway* (*supra*), ANDREWS, J., in delivering the opinion of the court, says: "The ground upon which private property may be taken for railroad uses, without the consent of the owner, is primarily that railroads are high-



ways furnishing means of communication between different points, promoting traffic and commerce, facilitating exchanges, in a word, they are improved ways. In every form of government the duty of providing public ways is acknowledged to be a public duty." In Cooley's Constitutional Limitations (p. \*533) it is said that "Every government is expected to make provision for the public ways, and for this purpose it may seize and appropriate lands. And as the wants of traffic and travel require facilities beyond those afforded by the common highway, over which any one may pass with his own vehicles, the government may establish the higher grade of highways, upon some of which only its own vehicles can be allowed to run, while others, differently constructed, shall be open to use by all on payment of toll. The common highway is kept in repair by assessments of labor and money; the tolls paid upon turnpikes or the fares on railways are the equivalents to these assessments, and when these improved ways are required by law to be kept open for use by the public impartially, they also may properly be called highways, and the use to which land for their construction is put be denominated a public use."

In *People v. Kerr* (27 N. Y. 188, 194) the court says: "The right of the public, that is of the people of the State, in a street or highway, is a right of passage. In the ordinary use of the highway, it is a right to pass and repass over its surface on foot or in carriages at pleasure. \* \* \* If the legislature or municipal authorities, under their sanction, should construct such a track (referring to railroads) in a particular street or road, and while allowing all persons to use that track freely with vehicles adapted to it, should close the road to every other kind of travel or use, it would, nevertheless, continue to be a highway, and devoted to a public use. \* \* \* These structures are public ways and public uses of property, and those by whom they are constructed and who receive their emoluments whether corporations or individuals are *quasi* public agents."

In *Olcott v. Supervisors* (16 Wallace, 678, 694) it was stated by Mr. Justice STRONG in delivering the opinion of the court: "That railroads, though constructed by private corporations and owned by them, are public highways has been the doctrine of nearly all the courts ever since such conveniences for passage and trans-

portation have had any existence. \* \* \* And the reason why the use has always been held a public one is that such a road is a highway, whether made by the government itself or by the agency of corporate bodies, or even by individuals when they obtain their power to construct it from legislative grant."

Is such a highway for "a city purpose?" We are aware that under another provision of the Constitution, which we shall consider later on, municipal governments are prohibited from loaning their credit to a railroad corporation, but this does not apply to a railroad constructed and owned by the city or affect the character of the use or the purpose for which it was constructed. Common highways are clearly within the provisions of the Constitution for a "city purpose." Railroads, as we have shown, are highways and constructed for the same purpose as the common highways. They are necessary for the common welfare of the people, required for their use, public in character and authorized by the legislature, and when constructed and owned by the city are for a "city purpose" within the meaning of the Constitution.

We have thus far considered the question independently of the provisions of the statute, which we deem conclusive upon the question. As we have seen, the statute provides that, if the road shall be constructed at the city's expense, the road or roads shall "be deemed to be a part of the public streets and highways of said city." Whilst the legislature cannot by an act create a city purpose out of that which is entirely foreign to a municipal government, it may, upon doubtful questions, give a legislative interpretation as to the meaning of words and phrases used in the provisions of the act which the courts are bound to respect. Here we have an express provision in aid of the authorities making the proposed road a part of the public streets and highways of the city, placing it upon the same footing, entitling it to the same consideration, and designing it for a "city purpose," with the same force and effect as if it was an ordinary public street.

The contention that such roads are highways, and as such may be for "a city purpose" within the meaning of the Constitution, is not in conflict with the prior subdivision of section ten of article eighth of the Constitution, which provides that: "No county, city, town or village shall hereafter give any money or property, or loan its

money or credit to or in aid of any individual, association or corporation, or become directly or indirectly the owner of stock in, or bonds of, any association or corporation." This provision should be construed with reference to the evils it was intended to correct. It first found place in the Constitution in 1874. Prior to this, there had been upon the statute books that which was commonly known as the Town Bonding Act. Under it numerous railroads had been built upon the bonds procured from towns through which they were constructed in return for stock issued by the corporations. The inhabitants of the towns were induced to give their consent through supposed benefits that would result to their property and upon representations that the earnings of the road would provide dividends upon the stock, with which they could pay their bonds. In some instances the bonds were procured and sold and the roads never built. In many other cases the roads in a few years were sold out under foreclosure of mortgages and the stock cut off. So great was the evil and so heavy was the burden upon the towns that relief was sought through a constitutional provision. It was this evil that the provision in question was intended to correct, and with this situation in view it should be construed. There had been, at that time, no attempt on the part of municipalities to construct and own railroads. Such a project had not been publicly promulgated, discussed or contemplated. The towns had subscribed for the stock in private corporations and in most instances they had lost. Hence, the provision that they should not give any money or loan their credit to or in aid of any individual, association or corporation, or become owners of stock or bonds of any such individual, association or corporation. This was not intended, nor does it prohibit municipalities from constructing their own roads and paying therefor when necessary and authorized by the legislature. In the case of *People ex rel. Murphy v. Kelly* (76 N. Y. 475) a corporation had been organized for the construction of a bridge over the East River between the cities of New York and Brooklyn. The cities had each subscribed to the capital stock of the company. After the bridge had been partially constructed the amendment to the Constitution of 1874 went into effect, prohibiting the further loaning of credit of municipalities to private corporations. The following year an act was passed permitting the two cities to acquire the stock of the

corporation, and for its dissolution and the continuance of the structure of the bridge by the cities as the owner. It was held that this was not in conflict with the amended provision of the Constitution, and that the construction of the bridge was for "a city purpose."

The acts in question, under a fair construction, do not require the city to loan its credit to or in aid of any individual, association or corporation. It is provided that in case the road shall be constructed by and at the city's expense, then and in that event the road so constructed shall be and remain the absolute property of the city so that whatever the municipality expends in the construction of the road is for the creation of its own property and is not in any sense a loan to an individual or corporation. It is said, however, that there is a provision for a lease of the road for a period not less than thirty-five nor more than fifty years and for successive renewals thereof; that a lease in perpetuity would be equivalent to ownership, and that the bonds issued by the city for construction would, in effect, be a loan of the credit of the city to the parties leasing the road; but such a construction would manifestly be violative of its spirit and intent. It would be in conflict with the express provision that the road should be and remain the absolute property of the city. It would not be in accord with the provision limiting the terms for which a lease may be made, and would not be in harmony with the provision requiring an appraisement or valuation of the property of the lessee employed in the equipment and operation of the road at the end of the lease in case it should not be renewed to the same individual, association or company. The provisions for a lease are not objectionable; they are rather in accord with our American form of government, which leaves trade and commerce to be carried on by individual industry and enterprise. The government has annually expended large sums in the construction of highways, in the digging of canals, in the building of harbors, and in the improving of the channels of rivers, for the purpose of aiding and promoting trade and commerce. Yet, its policy hitherto has been to leave the conduct of such business to individual enterprise. The city of New York is the owner of ferry rights, together with docks and piers which it has constructed upon its rivers. The docks and piers afford access to its water highways. These, with its ferry rights, it leases from time to time for specified

terms. In that way it furnishes highways in which its inhabitants may engage in the transportation of persons and property, thus promoting the commerce of the city. Nothing more is authorized to be done with reference to the leasing of the proposed railroad. It would be used for the same purpose and promote and facilitate the travel of persons and the commerce of the city. Nor do we think that a lease in perpetuity is permissible under the provisions of the acts. If such was contemplated, why limit the terms and provide for renewal leases? The evident intention was that, at the expiration of each term for which the road had been leased, a new contract should be made for the re-leasing of the road upon such terms and conditions as to the board should *then* seem just, not upon such terms and conditions as shall be fixed at the time of entering into the original lease. That this construction was intended is made apparent from the clause of the statute which follows, providing a valuation of the equipment used in operation in case the parties should not agree for a renewal of the lease, so that at each recurring period for renewal, the situation of the municipality and of the operator of the road, may then be taken into consideration, and the renewal then made upon such terms as shall be just. This view of the statute gives point to the provision declaring the road to be the property of the city, and it dissipates the theory of ownership by the lessee by reason of a lease in perpetuity.

We do not understand that the views above expressed are in conflict with the Ohio cases. In that state the Constitution does not limit municipal expenditures to "a city purpose." We do not, however, wish to be understood as approving of those cases, especially in so far as they sustain the right of a city to construct a railroad mainly outside of its own territory and state. In the case of *Walker v. City of Cincinnati* (21 Ohio St. 14) it was held to be within the legitimate scope of legislative power to authorize a city to construct railroads or other public improvements in which the city had a special interest and to impose taxes upon its citizens for that purpose. The question presented for consideration in that case was as to the constitutionality of an act of the General Assembly of the state under which the city of Cincinnati proposed to construct a railroad from its city to the city of Chattanooga, in the state of Tennessee. The Constitution provided that the General Assembly

shall never authorize any county, city, town or township, by vote of its citizens or otherwise, to become a stockholder in any joint stock company, corporation or association whatever, or to raise money or loan its credit to or in aid of any such company, corporation or association. It was held that the act was not violative of the Constitution. In the case of *Taylor v. Commissioners of Ross County* (23 Ohio St. 22) the question raised was as to the constitutionality of an act which authorized a town to construct a railroad and to levy taxes on the taxable property of the town for the purpose of building so much of the road in the town as could be built for the amount so raised, and for the issuing of bonds to complete the same, the road to be connected with another to be constructed through an adjoining town. It was held that the act was an attempt to evade the provisions of the Constitution and that it was in conflict therewith and, therefore, void. And to the same effect are the cases of *Wyscaver v. Atkinson* (31 Ohio St. 80) and *Counterman v. Dublin Township* (38 Ohio St. 515).

We might have some difficulty in sustaining the Rapid Transit Law, if its constitutionality depended upon its being general instead of local. It is provided that the legislature shall not pass a private or local bill granting to any corporation, association or individual the right to lay down railroad tracks (Const. art. III., §18), but we are of the opinion that the corporation, association or individual here referred to has no application or reference to a municipality, and that a county, city, town or village is not included within its provisions.

There are numerous other provisions which it is claimed are in conflict with other provisions of the Constitution. But these questions have been sufficiently discussed in the courts below.

Our government was established by the people for their own protection and welfare. Their policy was to foster and protect individual industry and enterprise. To such policy we owe our advancement as a nation, and to such we must look for our future prosperity. The Constitution should be construed with reference to this general policy, and, ordinarily, railroads should be constructed and operated by private capital. The situation, however, in the city of New York is most peculiar. A long, narrow island lies between two rivers, so narrow in places that there are practically

but two or three streets through which the masses must reach its business center. The population of the city during the last half century has increased from three hundred thousand to over a million and a half of people. The travel upon its existing railroads during the last twenty years has increased from 150,000,000 in 1874 to upwards of 448,000,000 in 1894. It was conceded upon the argument that the crowded and congested condition of the travel upon the streets in the city renders the proposed structure necessary. These considerations have induced us to give to the provisions of the act a most liberal construction. The commissioners located the road and tried to induce private capital to construct and operate it. In this they have failed, and the situation is such that the city must itself construct the road or go without it. Here we have a demand for a great public highway, which private enterprise and capital will not construct. It is necessary for the welfare of the people and is required by them. It is public in character and is authorized by the legislature.

Our conclusion is that, under the circumstances and situation here presented, the proposed road may properly be held to be "for a city purpose," and that the acts are not in contravention of the provisions of the Constitution.

The judgment should be affirmed, with costs.

ANDREWS, *Ch. J.*, GRAY, BARTLETT and MARTIN, *JJ.*, CONCUR. O'BRIEN and VANN, *JJ.*, DISSENT. Opinion by O'BRIEN, *J.* (152 N. Y. 262.)





REPORT  
OF THE  
CHIEF ENGINEER.



NEW YORK, January 1, 1902.

ALEXANDER E. ORR, *President*,

BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS.

CITY OF NEW YORK.

*Sir:*—I have the honor to present to you, in accordance with the instructions contained in a resolution of the Board, a report upon the work done under the authority of the Board from the commencement of construction in March, 1900, to December 31, 1901.

Previous to the letting of the Contract for the work now under construction, the Board had had prepared full and complete plans for a railway, part of whose route lay along Broadway from South Ferry to 42d Street, the undertaking of which was prevented by an adverse decision of the Appellate Division of the Supreme Court. In the preparation of these plans there were made preliminary but thorough investigations, not only of the needs for additional transportation facilities, but of the conditions attending the general problem of local passenger distribution in New York, and the physical features surrounding the carrying out of any comprehensive plan. One part of these investigations covered complete studies of the underground conditions of that portion of the city traversed by the route as to soil, building foundations, mains, pipes, sewers and other subsurface structures, and another part included a personal inspection of all railways, both in this country and Europe used for rapid intra-urban passenger transportation. As a result of all these studies and investigations, the Board came to certain general conclusions which, though in the first instance had reference to a Broadway route, nevertheless were so general in character as to govern the location of the route, and the design of the structure of any other railway, and consequently the one afterwards contracted for.

These general conclusions were, first, that in order to relieve the congestion of travel there was needed a railway located either directly along or as near as possible to the major lines of travel; secondly, that in order to bring the extreme limits of the city into closer relations, provision must be made for the running of trains with higher speed than was possible on any of the existing elevated

railways in New York, or in fact on any other intra-urban railway in any other city; thirdly, that underground construction should only be considered for those portions of the route along important thoroughfares; and, fourthly, that a route through private property in the lower portion of the city was neither feasible nor economical. These conclusions evidently demanded, therefore, that whatever railway was laid out must be either along Broadway or close to it; that it must have four tracks, and that in general it must follow street lines and be under ground. On this basis and with the above limitations the railway now under construction has been planned.

The general design of the structure itself is, so far as possible, of the shallow excavation type—that is, with the rail level as close to the surface of the street as gradients and local conditions will permit. In the original study of the problem three general types presented themselves for consideration.

First, the deep-tube type, a form of construction that had been employed in London in 1885-1890 in the City and South London Railway, and subsequently in the Waterloo and City, the Central London and other lines now under construction or projected, and in the Glasgow District Subway. These tubes are composed of cast-iron segments and are put in place in a circular excavation made by means of a "shield." The tunnels are driven in this manner at a depth varying from fifty to one hundred feet without regard to surface conditions. During construction access is had through shafts, which subsequently are used for elevator shafts to the stations when the railway is completed.

Second, an arched masonry tunnel, constructed in open excavation, but at such depth as to avoid the necessity for readjusting the water mains, gas pipes, electric conduits and other subsurface structures, and of many of the sewers. This is the general type of the Metropolitan and District Railways of London, the first "underground railways" to be constructed.

Third, a subway built as close to the surface of the street as possible. This involves a flat roof in order to avoid the loss of headroom in the curve of an arch, and also the complete readjusting of all sewers, mains, pipes and other similar structures. This type was projected in the plans of the "Arcade," "District" and other private





FOUR-TRACK STEEL WORK IN PLACE BETWEEN READE AND DUANE STREETS.

railway schemes proposed for New York fifteen to thirty years ago; was adopted as the type for the Glasgow Central Railway constructed in 1888-1894; by the Rapid Transit Commission of New York in 1891; by the company that built the railway in Budapest, Hungary, in 1894-96, and by the Boston Transit Commission for the subway in that city in 1894.

Each type has its advantages and disadvantages, which vary greatly according to local conditions, so that what may be the best in one case may not necessarily be so in others. In general it may be said that the advantages of the deep-tube type are the avoidance of interference with street traffic during construction; the necessity and expense of caring for or readjusting the other subsurface structures, and the ability to build the railway on any desired profile without regard, except in a moderate degree, to surface topography. Private property can also be passed under without serious encroachment. The disadvantages are that elevators are necessary to convey passengers between the platforms and street surface, and the cost of tube railways is apt to be greater than those constructed in open excavation on account of the greater expense attending tunneling operations, even when the expense of readjusting the sewers and mains, incident to surface work, is taken into account. The elevators are expensive to install and to operate, the cost per passenger being an appreciable amount when fares are limited to five cents; they involve delay and cannot accommodate the occasional maximum rush on some extraordinary occasion.

The arched tunnel at moderate depth is usually a compromise without attaining the benefits of either the deep or shallow types. The trench is deep, with a cost per linear foot substantially as great as tunneling. The subsurface structures have to be supported during construction, if not readjusted, and though elevators are avoided, the distance from street to platform level is too great for convenient or easy walking.

The third type is a subway built as close to the surface of the street as possible. The great advantage of this form is the reducing of the distance from the platform to the street level to the minimum, thus rendering access most easy. The disadvantages are inconvenience to abutting property owners and to street traffic during construction, and the necessity for and expense of readjusting all

sewers and mains encountered along the route. To the method of constructing railways in open excavation the expressive name of "Cut and Cover," originally given in England, is now universally applied.

These three types were considered by the Board. After weighing all the advantages and disadvantages your Engineer recommended the adoption, so far as possible, of the shallow excavation type on account of the greater convenience when completed and probable less expense to construct, a recommendation subsequently adopted by the Board as the basis of the general design.

Heretofore similar railways have been constructed for a single service with all trains stopping at all stations, with sometimes a limited express or through service on a third track, on which trains could run in the direction of the heaviest travel, according to the demands of the hour, and stopping at longer intervals than the other trains. It is obvious that this arrangement can furnish express facilities in only one direction at a time, and that the capacity of such a railway is only slightly greater than an ordinary double-track road, for the limit of capacity is determined by that of the single track on which the trains from both the other tracks are returned. In the case of the work now under contemplation it was recognized at the outset by all without discussion that this railway should represent a step in advance, and consequently it was determined that over the portion of the route where the traffic was heaviest four tracks should be constructed at once in order to provide for a double express service, and that over the balance of the route two or three tracks should be constructed.

When, in 1897, the Courts finally decided adversely to the construction of a railway under Broadway south of Thirty-fourth Street, the Board directed the Engineer to prepare plans and report the same to the Board for some route other than Broadway that would probably meet with the approval of the Court. At that time the proceedings relating to the opening of Elm Street, by which a thoroughfare parallel to Broadway and distant therefrom but 400 feet, had been completed, so that this route at once suggested itself as an effective and available alternative for Broadway. Plans were prepared and adopted by the Board on the 14th day of January and the 4th day of February, 1897. In order that the cost might not







WATERPROOFING FLOOR AND WALL OF SUBWAY—ELM STREET.

exceed a limit of \$35,000,000, which the Court had intimated would be the maximum that the judgment of the Court would approve as a proper expense for the municipality to incur, the southern terminus was fixed at the General Post Office, and thence four tracks were laid out along Park Row, Centre and Elm Streets, Lafayette Place, Fourth Avenue, 42d Street and Broadway to 104th Street. At this point the line divided, the West Side branch continuing with two tracks under Broadway to Fort George, and thence with a viaduct along Kingsbridge Road to Kingsbridge. An east line extended under 104th Street, Central Park, Lenox Avenue, Harlem River, East 149th Street to Third Avenue, and thence by a viaduct over Westchester Avenue, Southern Boulevard and Boston Road to Bronx Park. The total length of line thus laid out was 20.81 miles.

Immediately after arriving at a decision as to route, an investigation was begun as to the topographical and geological features, the nature of abutting buildings and their foundations, the sewerage system affected, and the presence of other surface and subsurface structures, such as elevated and surface railways, water mains, gas pipes, compressed air and steam conduits, subways for telegraph, telephone, light, power and other electric wires, etc.

It was found that south of Astor Place no rock would be encountered, the soil being for the most part sand, coarse in quality at the southerly end of the route but becoming finer to the north, and generally of a grade proper for use in mortar and concrete. North of Astor Place the micaceous gneiss, which is the normal rock formation of Manhattan Island, was encountered near enough to the street surface to be met with in the depth required for even a shallow excavation. Owing to the undulations of the rock surface not being parallel with the street surface, the borings indicated that north of Astor Place our work would be partly in rock and partly in earth, with abrupt transitions from one to the other on account of the faulty or irregular formation of the rock itself. Except along Lenox Avenue, where sand was found, the earth overlying the rock was found to be usually of glacial deposit, being clay with boulders of trap-rock, the latter having been carried from what is now New Jersey and deposited on Manhattan Island during the ice epoch.

Topographically the Borough of Manhattan of the City of New York is low at the south end, whence the surface gradually rises with a ridge along the axis of the island to the high ground beginning with the plateau of Morningside Heights on the west, thence extending across the upper end of Central Park, where the surface is about 130 feet above sea level, to the East River. This plateau is sharply terminated by the Manhattan Valley and the "Harlem Flats" at 125th Street and 110th Street, the street surface having an elevation of but 20 feet. On the west, the ground immediately rises with similar abruptness to form the ridge along the Hudson River known as Washington Heights, extending from 135th Street to Fort George, where another sharply defined termination occurs, the elevation of the surface falling from 225 feet to 30 feet. On the east, the low ground continues to the north side of the Harlem River, where it rises in a rock formation and continues well above sea level, except for a few local depressions, to the Bronx River.

Of artificial constructions for which provision had to be considered there were the elevated railways, the surface railways and the various subsurface structures. Along the route adopted there occurred five crossings of the elevated railway, at four of which the elevated structure would have to be underpinned and new foundations put in. Four surface electric railway tracks, of conduit type, were located on Park Row, and double tracks of the same on Centre Street, Fourth Avenue and Lenox Avenue. On 42d Street and Broadway there was, when the route was adopted, a double-track horse railway, but this was changed to conduit electric traction before the commencement of subway construction. On Westchester Avenue and Southern Boulevard there was a double-track electric trolley railway.

The subsurface structures were ascertained to be complex. The sewerage system of New York is the "combined" plan; that is, both house drainage and storm water are admitted into the same conduits, so that some sewers are necessarily very large and require that their capacity be maintained at all times during any reconstruction to provide for a sudden heavy rainfall. Fortunately for the most part the route followed closely the top of the ridge that runs centrally north and south with the city, so that only in a few cases were large cross sewers intercepted. The notable cases of this char-





FINISHING CONCRETE SIDE ARCHES OF SUBWAY. ABOVE THE MEN ARE THE WOODEN MOULDS, AND ABOVE THEM AND BEHIND THE STEEL IS THE WATERPROOFING.

acter were at Canal Street, West 45th Street, West 110th Street, and at Railroad Avenue. Of mains, pipes and electric subways of all kinds there was the usual assortment to be met with in a large city, but in which regard New York stands rather pre-eminent in the way of variety and complexity of arrangement. The gas pipes varied in size from 4-inch to 36-inch; the water mains from 6-inch to 48-inch, and the electric subways containing cables whose duty ranged from the delicate current for telephones to the powerful high-tension main currents of the street railway with 6,500 volts, and in addition there were the compressed air tubes of the postal system. All of these lines had to be maintained in operation, and most of them moved to new locations in the same or other streets, without material interruption of service, in order that both the Rapid Transit Subway and the pipes themselves could be accommodated. As unfortunately the pipe system of New York is a matter of growth without attempt at systematic arrangement, resulting in the various mains being interwoven as best they may at the time of their laying, the provisions for the mains and pipes had to be carefully worked out in advance.

Owing to the great and at times abrupt changes in topography and geological formation, it was not possible at all points to adhere to the general scheme for shallow construction. In preparing the design, while this method was adhered to whenever possible, radial departures were made locally. From the southern terminus to 33d Street, from 41st Street to 103d Street, along Broadway from 103d to 123d and 135th to 150th Streets, and along Lenox Avenue and part of East 149th Street, the rail level was laid out approximately parallel with and close to the street surface. At 33d Street, in order to avoid interference with the tunnel of the Metropolitan Street Railway Company, the Rapid Transit Subway was divided into two two-track tunnels to be driven beneath Murray Hill, one at each side of, but below, the street-car tunnel. On the East Side a two-track tunnel was planned from Broadway to the main drive in Central Park near Lenox Avenue in order to maintain reasonable gradients, and similar tunnels were found necessary on the West Side line between 150th and 155th Streets, and 158th Street and Fort George, and in the Bronx on 149th Street between Gerard Avenue and the Harlem Railroad yards. On the other hand, in

order to overcome depressions, viaducts were introduced on the West Side line between 122d and 135th Streets and north of Fort George, and on the East Side line north of Third Avenue. The amount of the three general types of construction is as follows:—cut and cover, 10.46 miles; tunnel, 4.55 miles; viaduct, 5.8 miles. The accompanying map and profile of the railway show where the several types occur.

In designing the structure it was decided to secure the absolute minimum of depth, the allowed limit of clearance between the street surface and the top of the subway being the depth of the yokes of the surface of the electric railway, which was 30 inches. The roof of the railway was made flat and as thin as possible. To meet the latter requirement columns were introduced between each track so that the roof beams need be deep enough to span but one track only, an arrangement that was found to be economical in expense and, by making individual members smaller, facilitated erection. The standard type was therefore a rectangular structure consisting of a concrete floor with steel ribs set five feet apart, with arches of concrete turned between them. In executing this design the procedure has been to lay down a bed of concrete, and on that erect, to a height of several feet, thin sidewalls of hollow brick. On this floor and against the walls is then spread the waterproofing, consisting of alternate layers of felt and asphalt, in number from two to six, according to the amount of ground water present. On top of this waterproofing course is spread another layer of concrete, and on top of the latter are set the foundations for the walls and centre columns. Then against the sidewalls are laid up terra-cotta ducts in double row, the hollow brick outer wall with the waterproofing being carried up in advance. Then the steel frames are erected, the jack arches turned and the waterproofing spread over the roof, over which is laid a protecting layer of concrete. The waterproofing has thus been protected from outside damage by the thin guard-walls of brick and the top layer of concrete. As a rule, there has been no hydrostatic pressure from ground water, the principal exceptions being in the neighborhood of Canal Street and on the approaches to the Harlem River. One great feature of this design is that it can be constructed in sections for either the full or part width, with an absolute certainty that the several sections







LARGE SEWER DIVIDED INTO THREE PARTS IN ORDER TO GAIN HEADROOM TO CROSS UNDER SUBWAY.  
EACH PART IS A CAST-IRON PIPE SURROUNDED BY CONCRETE.

will fit together, connections between the rigid members being made of plastic and easily molded concrete.

The sections in the tunnels presented no novel features except that the plans called for concrete lining. With the exception of the Murray Hill tunnel, where a three-centre arch was designed in order to lower the roof, the section has been semi-circular. This same section was also used in certain deep cuttings in the two-track lines where, owing to local topography, the space above the roof permitted an arch to be constructed. In such cases an arch was found to be more economical than steel frames. The steel viaduct followed, in general features of design, other similar elevated railways, except that it was designed stronger than such structures for urban railways usually are, in order to accommodate extra heavy rolling stock, viz., a motor car weighing 50 tons with a length of 46 feet.

As sewers in New York are usually laid at a depth of about 13 feet, and as the excavation for the railway was to be over 18 feet at the minimum, it was evident that a complete reconstruction of the sewerage system along the route would be necessary, involving the building of 7.21 miles of sewers along the route of the railway, and 5.13 miles of sewers in streets other than that followed by the route.

The general plan of procedure in dealing with sewers has been, where sewers have been encountered along the route, to plan and build two new sewers, one at each side of the railway and immediately next to the abutting houses, and to diminish to the minimum all cross-connections either over or under the railway. Where sewers cross the route said cross sewers have, so far as possible, been gathered together and passed beneath the railway in iron pipes with leaded joints buried in concrete, and a new outfall sewer has been built from the lower end of said cross-connection on a new gradient to such a point as is rendered necessary by the topography of the street to make a new connection with the already existing system. In this way all siphons, with one exception, have been avoided and the sewers left in a self-cleansing condition. Where sewers have been intersected, notably at Canal Street, at a point where the bottom of the railway passes below tide water, such a general scheme was not possible to follow. In this case a new route was selected for a new sewer and the flow diverted. Heretofore

the area extending easterly from Elm Street to Allen Street, and northerly from Leonard Street to Houston Street (190 acres), has, owing to the topography of the ground, found access for its drainage westerly along Canal Street from Elm Street to the Hudson River. A new sewer was planned to be built from Elm and Canal Streets easterly along Elm to Centre Streets; along Centre to Leonard Streets; along Leonard Street across Mulberry Bend Park to Mulberry Street, and through Worth Street to Chatham Square, where the natural divide at Chatham Square was cut at a depth of 31 feet. The route then followed Oliver Street to the East River where an outfall was selected under Pier 34. This sewer, a mile long, was completed April 8, 1901, since which date the one above described has had its discharge into the East River instead of the Hudson River. Three maps are appended showing the amount of the sewer reconstruction, while the accompanying pictures illustrate the details of such work.

The problem of preparing for the pipes was one of intricate detail, calling for special plans for particular points where they existed in number. As a general scheme it was proposed to leave the small pipes, i. e., those of 12 inches in diameter and under, on top of the roof, but the large mains were to be moved to or rebuilt in a new location at the side of the subway, if there was not sufficient space on top. At cross streets where the distance between the pavement and the top of the roof was insufficient to allow the longitudinal and lateral mains to cross each above the normal form of roof, additional space was secured by constructing a flat metal trough between adjacent roof beams and laying the lateral mains in it. If this additional space were still insufficient to accommodate large mains, it was planned that such mains could be subdivided into smaller pipes, but enough in number to provide a capacity equal to the undivided main. The original plans called for a buckled plate with concrete as the bottom of these troughs, involving a loss of about six inches. As a matter of fact, in practice we have used 3-inch beams resting on the flanges of the main roof beams with concrete between, and in extreme cases where every inch had to be saved a steel plate set flush with the bottom flanges of the roof beams has been supported by angles along the edges, thus reducing the thickness of roof to one-half inch.





INVERT OF ONE OF THE WOODEN BARREL SEWERS UNDER PIER 34, EMPTYING INTO THE EAST RIVER;  
COMPLETED SEWER AT RIGHT.

The detailed plans and specifications having been prepared they were submitted, at the request of your Engineer, to Messrs. George S. Morison, Past-President of the American Society of Civil Engineers, and Mr. Howard A. Carson, Chief Engineer of the Boston Transit Commission, for their examination. These gentlemen reported to the Board their approval, their letters appearing in the minutes of the Board under date of 18th December, 1897.

The several legal and financial difficulties which had prevented actual commencing of operations having been overcome during the autumn of 1899, the Board on November 15 of that year began the advertising of the contract as provided by law. In order not to exceed the limit of the debt-incurring capacity on the part of the City, bids were invited from contractors on the basis of dividing the whole route into four sections; the right being reserved by the Board to award contracts for the several sections beginning with the first, at intervals of not more than one year. These sections were as follows:

SECTION 1.—From the southern terminus at the City Hall to and including a station at 59th Street and Broadway.

SECTION 2.—All of the railroad on the north of such station at 59th Street, to and including a station at the intersection of 137th Street and Broadway; and on the East Side, from the junction at 103d Street and Broadway to and including a station at 135th Street and Lenox Avenue.

SECTION 3.—All of the railroad on the West Side north from a station at 137th Street to and including a station at Fort George; and on the East Side, from a station at 135th Street to and including a station at Melrose Avenue.

SECTION 4.—The remainder of the railroad from Fort George to Kingsbridge, and from Melrose Avenue to Bronx Park.

The lengths of railway covered by these various sections were as follows:

SECTION.	4 TRACK SUBWAY. MILES.	2-TRACK SUBWAY. MILES.	2-TRACK VIADUCT. MILES.	TOTAL.
1	5.00	...	...	5.00
2	2.26	3.43	.51	6.20
3	...	4.32	...	4.32
4	...	...	5.29	5.29
<hr/>				
Total -	7.26	7.75	5.80	20.81

The terms of the contract provided that the Contractor was to construct the four sections for a fixed sum, but to receive in addition the cost of all real estate necessarily acquired, and the expense of terminals at actual cost of the land and cost plus 10 per cent. of the improvements. The former amount was limited to \$1,000,000, and the latter to \$1,750,000. The Contractor was also required to furnish all equipment, on which the City was to have a first lien. According to the Rapid Transit Act, equipment is defined as including all motors, cars, whether used for passengers, freight, express or any other purpose, and all other rolling stock, all boilers, engines, wires, ways, conduits, mechanisms, machinery, power houses, all real estate upon which any such power houses shall stand or which shall be necessary for the generation or transmission of motive power, and all tools, implements and devices of every nature whatsoever used for such generation or transmission of motive power, and also all apparatus and devices for lighting, signalling and ventilation.

At noon on January 15, 1900, two bids were opened in the office of the Board and in the presence of all the Commissioners, Alexander E. Orr, President; John H. Starin, Vice-President; Woodbury Langdon, George L. Rives, Charles Stewart Smith, Morris K. Jesup; Robert A. Van Wyck, Mayor, and Bird S. Coler, Comptroller. There were also present Bion L. Burrows, Secretary; Edward M. Shepard and Albert B. Boardman, Counsel; and Wm. Barclay Parsons, Chief Engineer. Bid No. 1 was from John B. McDonald, of New York, as follows:

If for Section 1	-	-	-	-	\$15,000,000
If for Sections 1 and 2	-	-	-	-	26,000,000
If for Sections 1, 2 and 3	-	-	-	-	32,000,000
If for all four sections	-	-	-	-	35,000,000
EQUIPMENT.—Estimated at					-
	-	-	-	-	\$6,000,000



Bid No. 2, from Andrew Onderdonk, of New York, was as follows:

If for Section 1	-	-	-	-	-	\$17,000,000
If for Sections 1 and 2	-	-	-	-	-	28,000,000
If for Sections 1, 2 and 3	-	-	-	-	-	35,500,000
If for all four sections	-	-	-	-	-	39,300,000

PERCENTAGE.—5% on first million after \$5,000,000 of gross receipts, and  $2\frac{1}{2}$ % for each added million thereafter up to a maximum of 15%.

EQUIPMENT.—Estimated at - - - \$6,000,000

After a full investigation of the comparative merits of these two bids, which differed considerably in their character, the Board on January 16, all the Commissioners being present, unanimously voted that it would be for the best interest of the City of New York to accept the proposal of Mr. John B. McDonald; and the Board further, on the same date, directed that the President should in due form, in the name and on behalf of the Board, exercise the option reserved to the City by the contract for the construction and operation of Sections 2, 3 and 4, as well as Section 1. In accordance with this decision, the contract for the whole line was signed and executed on February 21, 1900.

An estimate of quantities was made covering the whole of the work and submitted to the contractors who were considering bidding, without however incurring any responsibility on the part of the Commission. These quantities are shown on page 198; the sections to which they refer having the same geographical limits as the four Contract Sections described above. Approximately, the whole of Sections 1, 2 and 3 is underground, except the viaduct on Section 2, West Side, over the Manhattan Viaduct; and, approximately, the whole of Section 4, both east and west, is viaduct.

The actual construction of the railroad was begun, with suitable public ceremony, in front of the City Hall on March 24, 1900, in the presence of the Commissioners of the Rapid Transit Board and the various City officials, by making an excavation, which subsequently was covered with a bronze tablet commemorating the

## QUANTITIES.

ITEM	UNIT	SECTION 1.	SECTION 2, WEST.	SECTION 2, EAST.	SECTION 3, WEST.	SECTION 3, EAST.	SECTION 4, WEST.	SECTION 4, EAST.	TOTAL
Length . . . . .	Lin. ft.	26,325	21,242	11,337	11,548	7,423	14,683	17,012	109,570
Earth Excavated . . . . .	Cu. yds.	944,503	338,088	166,779	41,793	200,367	1,580	7,118	1,700,228
Rock " . . . . .	"	371,833	417,903	3,396	89,984	34,446	222	3,398	921,182
" tunneled . . . . .	"	67,236		78,400	130,777	21,493	70,700		368,606
Steel Beams . . . . .	Net tons.	11,660	6,177	1,963	838	961		100	21,729
" rivetted . . . . .	"	11,860	6,458	959	367	459		44	20,147
" viaduct . . . . .	"		2,100				9,488	11,580	23,168
Cast Iron . . . . .	"	1,093	377	110	66	6,255			7,901
Concrete . . . . .	Cu. yds.	201,524	116,383	52,782	49,795	47,827	17,649	3,162	489,122
Brick, common . . . . .	"	4,816	2,435	1,452		1,030			9,733
" enameled . . . . .	"	4,164	2,057	578	518	468			7,585
" facing . . . . .	"		915					86	1,001
Stone pedestals . . . . .	"	4,546	2,459	670	267	307		36	8,285
Stone, cut . . . . .	"		1,923				535	845	3,303
Viaduct foundations . . . . .	Number.		86				446	692	1,224
Waterproofing . . . . .	Sq. yds.	386,599	257,207	70,657	14,404	42,472	200	4,256	775,795
Vault lights . . . . .	"	6,183	327			130			6,640
Restoring street surface . . . . .	"	134,203	80,479	29,402	11,295	13,487		1,780	270,646
" park " . . . . .	"		31,739	1,960					33,699
Track, underground . . . . .	Lin. ft.	106,617	67,205	23,044	23,797	15,001	7,810	2,040	245,514
" elevated . . . . .	"		4,336				22,356	33,074	59,766





BRONZE TABLET SET IN PAVEMENT IN FRONT OF CITY HALL.

event. The inscription on this tablet, in raised letters, is shown on the page opposite.

For convenience in superintending the construction, the Board divided the work into five divisions, each division being in charge of a Division Engineer, and gave the Chief Engineer a general assistant with the title of Deputy Chief Engineer. In addition there were created the positions of General Inspector of Designs, the holder thereof to have charge of the preparation of all detail designs, and of General Inspector of Material, who was to have charge of inspecting all steel, cast-iron, cements, paints, asphalt and other material required in the work.

Division No. 1 included all the work on the railroad from City Hall to the centre of 41st Street and Park Avenue; Division No. 2, from the centre of 41st Street and Park Avenue to the centre of 104th Street; Division No. 3, from 104th Street to the portal of the tunnel at Fort George on the West Side, and to the portal of the tunnel at Westchester Avenue on the East Side; Division No. 4, all of the viaduct work north of the last two mentioned points, and also the viaduct over the Manhattan Valley between 125th and 135th Streets; and the Sewer Division, all reconstruction of sewers in streets off the route of the railway.

Each Division, and the Bureau of Inspection has had an office separate from the general office, with an appropriate force of assistant engineers and inspectors. The Bureau of Inspection has had a head office in Pittsburg, a cement testing laboratory at Coplay, Pa., and with subsidiary offices at Pencoyd and Warren, Pa.

The following table gives a list of all appointments, with rank and duration of service:

# CHIEF ENGINEER'S OFFICE.

Name.	Title.	Entered Service.	Remarks.
George S. Rice, .....	Deputy Chief Engineer.	March 1, 1900	
St. John Clarke, .....	Gen. Insp. of Designs.	May 14, "	
M. J. Farrell, .....	Private Secretary .....	March 1, "	
George Perrine, .....	Assistant Engineer.....	April 1, "	Resigned, Aug. 13, 1900.
Sverre Dahm, .....	Assistant Engineer.....	June 20, "	
Frederick C. Noble, .....	Assistant Engineer.....	June 1, "	
Peter C. Spence, .....	Assistant Engineer.....	June 1, "	Resigned, June 30, 1900.
Ralph Cranmer, .....	Assistant Engineer.....	July 3, "	
Joshua Binion, .....	Assistant Engineer.....	May 1, "	
Aaron I. Raisman, .....	Assistant Engineer.....	June 5, "	
Tyrrell B. Shertzer, .....	Assistant Engineer.....	Dec. 28, "	
Daniel L. Turner, .....	Assistant Engineer.....	Jan. 21, 1901	
Wm. F. Stevenson, .....	Assistant Engineer.....	Oct. 24, "	
James C. Meem, .....	Assistant Engineer.....	April 9, 1900	
Frederick Wilcock, .....	Assistant Engineer.....	March 25, 1901	
A. J. Malukoff, .....	Draughtsman .....	May 1, 1900	
William A. Collins, .....	Draughtsman .....	May 22, "	
Charles Rodenburg, .....	Draughtsman.....	May 4, "	
David E. Baxter, .....	Draughtsman.....	June 5, "	
Jasper T. Kane, .....	Draughtsman.....	May 7, "	
William H. Hunt, .....	Draughtsman.....	Nov. 27, "	
Charles E. Conover, .....	Draughtsman.....	Dec. 17, "	
Andrew Lindsay, .....	Draughtsman.....	Jan. 1, 1901	Resigned, May 7, 1901.
John A. Gorman, .....	Draughtsman.....	Aug. 5, "	
Maurice J. Allen, .....	Draughtsman.....	Aug. 5, "	
Chas. S. McCarthy, .....	Draughtsman.....	Oct. 11, "	
Edgar M. North, .....	Rodman.....	July 29, "	
Charles J. Tilden, .....	Inspector of Steel.....	Feb. 21, "	
Homer A. Reid, .....	Inspector of Steel.....	Feb. 25, "	
Claiborne F. Gardner, .....	Inspector of Steel.....	March 11, "	Resigned, July 21, 1901.
William J. Duncan, .....	Inspector of Steel.....	July 8, "	
William E. Guilfoyle, .....	Stenographer.....	May 1, 1900	
Henry F. Schlutzen, .....	Stenographer.....	Aug. 6, "	
Matthew M. Feely, .....	Stenographer.....	Aug. 14, "	
Pierre P. Pullis, .....	Photographer .....	June 1, "	
William E. Dalton, .....	Office Boy .....	Feb. 18, 1901	
John E. Copeland, .....	Office Boy .....	July 15, "	

# FIRST DIVISION.

Name.	Title.	Entered Service.	Remarks.
Albert Carr.....	Division Engineer.....	Mar. 15, 1900	
George H. Clark.....	Assistant Engineer.....	Mar. 14, "	
Justin Burns.....	Assistant Engineer.....	May 1, "	
Ralph N. Wheeler.....	Assistant Engineer.....	May 1, "	
Henry L. Oestreich, Jr.	Assistant Engineer.....	May 14, "	
Arthur D. Prince.....	Assistant Engineer.....	Oct. 1, "	
Waldo C. Briggs.....	Assistant Engineer.....	Oct. 1, "	Resigned, Mar. 16, 1901.
Gustave C. Davin.....	Assistant Engineer.....	Sept. 1, "	
Philip P. Farley.....	Assistant Engineer.....	Oct. 15, "	
Jesse O. Shipman.....	Assistant Engineer.....	June 18, "	Promoted from Transitman, July 3, 1901.
Edwin H. Thomes....	Assistant Engineer.....	May 1, "	Promoted from Transitman, Sept. 1, 1901.
Burdett Kipp.....	Assistant Engineer. ....	Nov. 12, "	Promoted from Transitman, Oct. 1, 1901.
Charles A. Hunt.....	Assistant Engineer.....	Jan. 1, 1901	
Jesse A. Martin.....	Assistant Engineer.....	Jan. 1, "	Died May 7, 1901.
Abraham Lodholz....	Assistant Engineer.....	Feb. 1, "	
John W. Goodridge....	Assistant Engineer.....	Mar. 11, "	
Edmund P. Ramsey....	Assistant Engineer.....	April 4, "	
Charles U. Powell.....	Assistant Engineer.....	April 8, "	
Charles A. Sullivan....	Assistant Engineer.....	June 1, "	
Richard B. Post.....	Topo'l Draughtsman....	Dec. 1, 1900	
Reuben S. Lind.....	Stenographer.....	Sept. 10, "	
Clarence F. Bell.....	Rodman.....	Oct. 1, "	Resigned, May 7, 1901.
Alfred R. Loweth.....	Rodman.....	June 14, "	
Louis A. Walsh.....	Rodman.....	June 1, "	Transferred to Sewer Dept., Feb. 7, 1901.
Joseph McLoughlin...	Rodman.....	Sept. 14, "	Transferred to Dept. of Water Supply, Mar. 13, 1901.
Cornelius J. Gaffney...	Rodman.....	Sept. 17, "	
Drew Linard.....	Rodman.....	Jan. 25, 1901	
Henry Branfuehr.....	Rodman.....	Feb. 5, "	
Egbert V. Lawrence...	Rodman.....	Jan. 25, "	Promoted from Axeman, Sept. 16, 1901.
Henry L. Connell.....	Rodman.....	Mar. 1, "	Promoted from Axeman, Aug. 7, 1901.
Irving F. Putney.....	Rodman.....	Mar. 1, "	Promoted from Axeman, Dec. 1, 1901.
Edward T. Ebert.....	Rodman.....	Aug. 1, "	
Jacob Schmitt.....	Rodman.....	Aug. 5, "	
Isaac S. Voorhees....	Rodman.....	Aug. 19, "	
Bernard G. Barton....	Rodman.....	Aug. 26, "	
Geo. J. Schwietzer....	Rodman.....	Dec. 16, "	

FIRST DIVISION—Continued.

Name.	Title.	Entered Service	Remarks.
James W. Reilly.....	Rodman.....	Dec. 1, 1901	
Joseph Goldberg.....	Rodman.....	May 5, 1900	Promoted from Axeman, June 1, 1901.
Frank J. Perry.....	Rodman.....	Nov. 1, 1900	Promoted from Axeman, Aug. 1, 1901.
Louis Sonn.....	Rodman.....	Oct. 15, 1901	
George S. Clarke.....	Axeman.....	Jan. 11, "	Resigned, Feb. 8, 1901.
John G. Horgan.....	Axeman.....	Jan. 28, "	
Peter A. Farrell.....	Axeman.....	Feb. 1, "	
Godfrey Branfuhr, Jr.	Axeman.....	Mar. 1, "	
John T. Dowd.....	Axeman.....	Mar. 4, "	Resigned, Dec 7, 1901
Frank C. Fox.....	Axeman.....	Mar. 25, "	
Edward F. Fitzgerald..	Axeman.....	April 1, "	Transferred to Dept. Water Supply, Sept. 15, 1901.
William F. Mercer....	Axeman.....	April 1, "	
Edward P. Kelly.....	Axeman.....	April 22, "	
John A. Connell.....	Axeman.....	April 24, "	Transferred to Dept. Water Supply, Sept. 15, 1901.
Richard J. Cullen.....	Axeman.....	April 29, "	
Peter Loomam.....	Inspector of Masonry..	Oct. 10, 1900	
Seymour P. Bradley...	Inspector of Masonry..	Oct. 15, "	
Arthur E. Gunn.....	Inspector of Masonry..	Nov. 1, "	
John Miles.....	Inspector of Masonry..	Jan. 6, 1901	
Frank A. Miller.....	Inspector of Masonry..	Jan. 20, "	
Joseph Ridgway.....	Inspector of Masonry..	Jan. 24, "	
Theodore Belzner.....	Inspector of Masonry..	Jan. 24, "	
Forbes Gerard.....	Inspector of Masonry..	Jan. 24, "	
Matthew J. Conley.....	Inspector of Masonry..	Feb. 11, "	
Robert F. Higgins....	Inspector of Masonry..	Mar. 1, "	
Peter O'Flynn.....	Inspector of Masonry..	Mar. 2, "	
Percy E. Lyon.....	Inspector of Masonry..	Mar. 6, "	
Edward L. Gill, Jr....	Inspector of Masonry..	April 19, "	
Michael R. Stack.....	Inspector of Masonry..	Oct. 4, 1900	
Patrick J. Lovely.....	Inspector of Masonry..	May 8, 1901	
Walter F. Smith.....	Inspector of Masonry..	June 19, "	
Henry C. Smith.....	Inspector of Masonry..	June 26, "	
Clarence P. Fish.....	Inspector of Masonry..	July 16, "	
Thomas J. Murray.....	Inspector of Masonry..	July 22, "	
Edward D. Vaughn....	Inspector of Masonry..	Aug. 4, "	
Daniel D. Sheehan....	Inspector of Masonry..	Aug. 18, "	
Richard J. McConnell..	Inspector of Masonry..	Aug. 30, "	
Thomas J. Fallon.....	Inspector of Masonry..	Aug. 30, "	
James L. Dennison....	Inspector of Masonry..	Oct. 3, "	Resigned, Nov. 11, 1901.
George M. McCloskey..	Inspector of Masonry..	Oct. 3, "	
Alfred Lennon.....	Inspector of Masonry..	Oct. 10, "	
John J. Lilley.....	Office Boy.....	Oct. 5, "	



# SECOND DIVISION.

Name.	Title.	Entered Service.	Remarks.
Alfred Craven.....	Division Engineer.....	May 1, 1900	
Robert Ridgway.....	Assistant Engineer.....	May 9, "	
John H. Myers, Jr.....	Assistant Engineer.....	May 1, "	
A. A. Sproul, Jr.....	Assistant Engineer.....	June 11, "	
William E. Swift.....	Assistant Engineer.....	Aug. 6, "	
Robert H. Jacobs.....	Assistant Engineer.....	May 9, "	
Lazarus White.....	Assistant Engineer.....	Sept. 1, "	
Edmund M. Blake.....	Assistant Engineer.....	Oct. 25, "	
George S. Frost.....	Assistant Engineer.....	Nov. 19, "	
Bayly Hipkins.....	Assistant Engineer.....	June 7, "	Promoted from Transitman, Oct. 1, 1901.
Lawrence C. Brink....	Assistant Engineer.....	Jan. 8, 1901	
Alexander Thomson, Jr.	Assistant Engineer.....	April 1, "	
Louis P. deLuze.....	Assistant Engineer.....	April 1, "	
John H. Madden.....	Assistant Engineer.....	June 7, "	
Joseph R. Geoghan....	Assistant Engineer.....	June 17, "	
Arthur E. Wenige.....	Transitman.....	July 2, 1900	
George H. Lesley.....	Topo'l Draughtsman....	Dec. 1, "	
Joseph F. Banks.....	Rodman.....	June 1, "	
Henry Sunkle.....	Rodman.....	June 1, "	
Richard W. McDonald.	Rodman.....	June 9, "	
Elisha T. Barrett.....	Rodman.....	Oct. 1, "	
Charles U. Stepath....	Rodman.....	Oct. 1, "	
William P. Gay.....	Rodman.....	June 1, "	Promoted from Axeman, Sept. 8, 1900.
Stephen E. Meagher...	Rodman.....	Aug. 1, "	Promoted from Axeman, Sept. 1, 1901.
Roderick Ross.....	Rodman.....	Oct. 25, "	Promoted from Axeman, Sept. 1, 1901.
William G. Foy.....	Rodman.....	Nov. 1, "	Promoted from Axeman, Aug. 5, 1901.
Andrew Veitch, Jr....	Rodman.....	Nov. 1, "	Promoted from Axeman, Aug. 5, 1901.
Israel V. Werbin.....	Rodman.....	Aug. 7, 1901	
George H. Knight, Jr..	Rodman.....	Sept. 18, "	
Thomas T. Craven....	Rodman.....	Nov. 4, "	
John J. Welch.....	Axeman.....	Jan. 25, "	
Anthony E. Hoffman...	Axeman.....	Jan. 26, "	
Frank C. Seward.....	Axeman.....	Feb. 1, "	Transferred to Dept. Highways, Aug. 5, 1901.
Leo C. Clarke.....	Axeman.....	Feb. 1, "	
Michael F. Corkery....	Axeman.....	April 19, "	
William J. Keogh.....	Axeman.....	April 24, "	
Robert Tighe.....	Axeman.....	June 27, "	
Frank McGuire.....	Axeman.....	June 28, "	

## SECOND DIVISION—Continued.

Name.	Title	Entered Service	Remarks.
Charles N. Green.....	Inspector of Steel.....	Mar. 11, 1901	
Frederick Jackson.....	Inspector of Masonry..	Oct. 11, 1900	
P. W. Corcoran.....	Inspector of Masonry..	Dec. 17, "	
Charles E. Richards...	Inspector of Masonry..	April 1, 1901	
Donato Cuzzo.....	Inspector of Masonry..	April 1, "	
Patrick J. O'Toole.....	Inspector of Masonry..	April 19, "	
Andrew J. Sparrow.....	Inspector of Masonry..	April 21, "	
Wm. H. Hanrahan.....	Inspector of Masonry..	May 8, "	
Benjamin F. Hannan...	Inspector of Masonry..	Nov. 1, 1900	
John J. McDermott...	Inspector of Masonry..	May 16, 1901	
William McElroy.....	Inspector of Masonry..	June 19, "	
Edward F. Adams.....	Inspector of Masonry..	June 23, "	
Thomas B. McGuire...	Inspector of Masonry..	July 18, "	
William P. Jewett.....	Inspector of Masonry..	July 22, "	
Carl Schmidtke.....	Inspector of Masonry..	Aug. 7, "	
Michael Reilly.....	Inspector of Masonry..	Sept. 3, "	
Thomas H. McElroy...	Inspector of Masonry..	Sept. 15, "	
Solon E. Nichols.....	Inspector of Masonry..	Sept. 28, "	

## THIRD DIVISION.

Name.	Title	Entered Service.	Remarks
Beverly R. Value.....	Division Engineer.....	June 1, 1900	
F. W. Carpenter.....	Assistant Engineer.....	June 6, "	
C. V. V. Powers.....	Assistant Engineer.....	June 1, "	
Wilson F. Smith.....	Assistant Engineer.....	June 18, "	
Julian Thornley.....	Assistant Engineer.....	June 1, "	Promoted from Rodman, Aug. 1, 1900.
George A. Taber.....	Assistant Engineer.....	Aug. 1, "	
Charles D. Searle.....	Assistant Engineer.....	Aug. 23, "	
Stephen U. Hopkins...	Assistant Engineer.....	Oct. 1, "	
William Hauck.....	Assistant Engineer.....	Oct. 1, "	
Michael H. Ryan.....	Assistant Engineer.....	Nov. 12, "	
James P. Locke.....	Assistant Engineer.....	Jan. 9, 1901	
George F. Simpson...	Assistant Engineer.....	Feb. 7, "	
Leicester Durham.....	Assistant Engineer.....	Apr. 1, "	
Henry B. Machen.....	Assistant Engineer.....	Apr. 8, "	
William W. Mills.....	Assistant Engineer.....	May 22, "	
Henry J. Alexander...	Assistant Engineer.....	June 10, "	
James W. Carrier.....	Assistant Engineer.....	June 19, "	
Walter L. Tremper....	Transitman .....	July 2, 1900	
John Kelly.....	Stenographer.....	Aug. 6, "	
Stephen H. Dolan....	Rodman .....	June 23, "	
George A. Hefter.....	Rodman .....	Aug. 1, "	
John R. McGrath.....	Rodman .....	July 23, "	Promoted from Axeman, Oct. 1, 1900.
Wm. F. Steinmetz....	Rodman .....	Jan. 21, 1901	Promoted from Axeman, Oct. 10, 1901.

### THIRD DIVISION—Continued.

Name.	Title.	Entered Service.	Remarks.
Chauncey DeVoe.....	Rodman.....	Sept. 25, 1900	
Durrell Lord.....	Rodman.....	June 23, "	Promoted from Axeman, Feb. 1, 1901.
Harold T. Kinch.....	Rodman.....	July 2, "	Promoted from Axeman, June 1, 1901.
Thomas B. Dyer.....	Rodman.....	Oct. 17, 1901	
Henry J. Lynch.....	Rodman.....	Aug. 1, "	
Leonard H. Van Every..	Rodman.....	Oct. 15, "	
John J. Norris.....	Rodman.....	Oct. 27, 1900	Promoted from Axeman, Sept. 1, 1901.
George E. Morrison...	Axeman.....	July 18, "	Resigned, Jan. 13, 1901.
John F. Mauser, Jr....	Axeman.....	Aug. 15, "	
Frederick Ward.....	Axeman.....	Nov. 1, "	Resigned, Dec. 1, 1900.
Alfred T. Brown.....	Axeman.....	Jan. 14, 1901	Resigned, May 1, 1901.
Otto Bernhardt.....	Axeman.....	Mar. 25, "	
Charles A. Wood.....	Axeman.....	Mar. 25, "	
Enos W. Cory.....	Cement Tester.....	Oct. 22, 1900	
George C. Dinsmore...	Inspector of Masonry..	Aug. 12, "	
Geo. C. Abernathy.....	Inspector of Masonry..	Aug. 27, "	
William F. Quinn.....	Inspector of Masonry..	Oct. 28, 1900	
John Thornton.....	Inspector of Masonry..	Nov. 16, "	
William D. Phelan ....	Inspector of Masonry..	Jan. 14, 1901	Resigned, June 27, 1901.
Matthew Reilly.....	Inspector of Masonry..	Mar. 1, "	
John Byrne.....	Inspector of Masonry..	Mar. 21, "	
Eugene McLoughlin...	Inspector of Masonry..	Apr. 3, "	Resigned, Apr. 21, 1901.
George E. Heath.....	Inspector of Masonry..	Apr. 18, "	
Richard Black.....	Inspector of Masonry..	May 1, "	
Joseph J. Gaffney.....	Inspector of Masonry..	May 13, "	
Patrick J. Crennan....	Inspector of Masonry..	Aug. 5, "	
Stephen Harrington...	Inspector of Masonry..	Aug. 31, "	
Michael Hannigan.....	Inspector of Masonry..	Sept. 28, "	
Alexander Austin.....	Inspector of Masonry..	June 11, 1900	
Edward W. Lynch ....	Inspector of Masonry..	Aug. 5, 1901	

### FOURTH DIVISION.

Name.	Title.	Entered Service.	Remarks.
Eugene Klapp.....	Division Engineer.....	July 16, 1900	
Justin O. Reynolds....	Assistant Engineer.....	Aug. 1, "	
Horace J. Howe.....	Assistant Engineer.....	Aug. 3, "	
Theodore W. C. Happel	Assistant Engineer.....	Aug. 1, "	
Frederick R. Harris...	Assistant Engineer.....	Oct. 8, 1901	
Guy W. Culgin.....	Assistant Engineer.....	Dec. 1, "	
Charles A. Thomas ....	Rodman.....	Aug. 1, 1900	

FOURTH DIVISION—Continued.

Name.	Title.	Entered Service.	Remarks.
Peter F. Daly.....	Rodman.....	Aug. 1, "	
Walter P. Butler.....	Rodman.....	Sept. 17, "	
Richard A. Berry.....	Rodman.....	Oct. 1, "	
Orman T. Babcock...	Rodman.....	July 1, 1901	Promoted from Axeman, Aug. 1, 1901.
Francis X. Martin.....	Rodman.....	Oct. 11, "	
Albert J. Mayell.....	Rodman.....	Oct. 15, "	
Tryon P. Edwards....	Rodman.....	Oct. 18, "	
Whitford Bennett....	Rodman.....	Dec. 1, "	
Michael M. Reynolds..	Inspector of Masonry..	April 12, "	
Andrew McCarthy.....	Inspector of Masonry..	Jan. 27, "	
Daniel P. O'Keefe.....	Inspector of Masonry..	Sept. 25, "	

SEWER DIVISION.

Name.	Title.	Entered Service.	Remarks.
Calvin W. Hendrick...	Division Engineer....	Mar. 15, 1900	
Clarence D. Pollock...	Assistant Engineer....	May 21, "	
Clarence W. Marsh....	Assistant Engineer....	Aug. 1, "	
Ernest W. Clarke.....	Assistant Engineer....	July 30, "	
Henry W. Durham.....	Assistant Engineer....	July 20, "	
Amos L. Schaeffer....	Assistant Engineer....	May 1, "	Promoted from Transitman, Sept. 1, 1901.
John D. Griffiths.....	Transitman.....	May 1, "	
Joseph F. Joyce.....	Leveler.....	June 8, "	Transferred to Dept. Highways Oct. 4, 1900.
James E. Ray.....	Stenographer.....	Aug. 6, "	
William J. Dunsing....	Rodman.....	June 1, "	
Edward Herrmann....	Rodman.....	June 14, "	
Martin J. Lyons.....	Rodman.....	June 20, "	
Otto Claussner.....	Rodman.....	May 4, "	Promoted from Axeman, July 18, 1900.
Joseph L. Hunt.....	Rodman.....	Sept. 4, "	
Cornelius Mulcahy....	Rodman.....	Sept. 17, "	
Francis A. Dillon.....	Rodman.....	Aug. 1, "	Promoted from Axeman, Sept. 1, 1901.
James J. McGuire, Jr..	Rodman.....	Aug. 1, "	Promoted from Axeman, Sept. 1, 1901.
William Phelan.....	Inspector of Masonry..	April 4, "	
David W. Dowling....	Inspector of Masonry..	May 11, "	Resigned, Aug. 18, 1900.
John Glendinning.....	Inspector of Masonry..	May 24, "	
William J. Reilly.....	Inspector of Masonry..	June 26, "	
William E. Barton.....	Inspector of Masonry..	Aug. 12, "	
Isaac L. Joralemon....	Inspector of Masonry..	Aug. 12, "	
Frederick P. Gaudineer.	Inspector of Masonry..	Aug. 24, "	
John McMurray.....	Inspector of Masonry..	Aug. 29, "	
Michael Dooley.....	Inspector of Masonry..	Sept. 11, "	
Martin V. Dolan.....	Inspector of Masonry..	Sept. 16, "	
Elmer S. Van Aken....	Inspector of Masonry..	Sept. 20, "	
John J. Griffin.....	Inspector of Masonry..	Sept. 30, "	
Thomas McDermott....	Inspector of Masonry..	Oct. 31, "	
Henry W. Doherty....	Inspector of Masonry..	Nov. 11, "	

# DEPARTMENT OF INSPECTION OF MATERIAL.

NAME.	TITLE.	ENTERED SERVICE.	REMARKS.
William A. Aiken.....	Gen. Insp. of Material..	June 1, 1900	
Robert J. Davis.....	Inspector of Steel.....	Sept. 19, "	Resigned Mar. 10, 1901.
James L. Davis.....	Inspector of Steel.....	Aug. 29, "	
George L. Lucas.....	Inspector of Steel.....	Sept. 24, "	
Lewis G. Wilcox.....	Inspector of Steel.....	Aug. 30, "	
David B. Oviatt.....	Inspector of Steel.....	Aug. 30, "	
Max Feldman.....	Inspector of Steel.....	Oct. 30, "	Resigned Apr. 10, 1901.
George Peters.....	Inspector of Steel.....	Nov. 26, "	
Charles H. Vansant....	Inspector of Steel.....	Jan. 28, 1901	
Frank A. Stees.....	Inspector of Steel.....	Apr. 16, "	
George R. Miller.....	Inspector of Steel.....	Apr. 13, "	
J. E. Newlands.....	Inspector of Steel.....	June 21, "	Resigned Oct. 6, 1901.
Israel Aubey.....	Inspector of Steel.....	July 29, "	Resigned Sep. 14, 1901.
Charles B. Thomas....	Inspector of Steel.....	Oct. 1, "	
Samuel P. Davis.....	Inspector of Steel.....	Oct. 1, "	
Joseph A. Power.....	Inspector of Steel.....	Nov. 7, "	
Henry T. Bradbury....	Inspector of Steel.....	Nov. 15, "	
Otto S. Marckworth....	Inspector of Steel.....	Nov. 1, "	
R. L. Oberholser.....	Steel Chemist.....	Dec. 5, 1900	
R. Frank Walker.....	Cement Tester.....	Oct. 15, "	
Thomas M. McLeod....	Cement Tester.....	Nov. 5, "	Resigned Apr. 10, 1901.
Samuel T. Adams.....	Cement Tester.....	Dec. 22, "	Resigned Sep. 1, 1901.
Albert B. Woythaler...	Cement Tester.....	May 13, 1901	
Clarence B. Marriott...	Cement Tester.....	Sept. 16, "	
Thaddeus A. Judson...	Cement Tester.....	Dec. 1, "	

All the above positions, except the exempt ones of Division Engineers, General Inspectors, Private Secretary and Photographer, were filled after competitive examination by the Civil Service Commission. As indicating the grade of men thus secured, it is of interest to note the number of those who had received a collegiate training and the institutions where educated, as shown on the following page.

## ENGINEERING STAFF—EDUCATIONAL STATISTICS.

[illegible]

The Contractor immediately after the signing of the contract organized his staff by appointing Mr. S. L. F. Deyo as his Chief Engineer, and Mr. E. P. Bryan as General Manager to lay out a scheme for the operation of the road and the acquisition of the necessary equipment. Subsequently he added Mr. L. B. Stillwell as Electrical Director, Mr. J. Van Vleck as Mechanical Engineer, and Mr. George Gibbs as Car Designer, all engineers particularly eminent in their several specialties. The Contractor then divided the railway into fifteen sections—the beginning and ending of these several sections being fixed by local conditions necessitating variations in the construction. Contractor's sections 1, 2, 3 and 4 constitute Board Division No. 1; Sections 5a, 5b, 6a and 6b, Board Division No. 2; Sections 7, 8, 9a, 9b, 11, 13 and 14, Board Division No. 3; and Sections 10, 12 and 15, Board Division No. 4.

The subjoined table gives the various sections, the limits of each, the names of the sub-contractors, the bonds given by each one, and the dates when work was begun. A list of the contracts for steel and other material used in construction is also annexed. The sub-contractors' bonds have been assigned to the City as additional security for the completion of the general contract.

#### CONTRACTS FOR CONSTRUCTION.

Section No.	Sub-section Limits.	Name of Sub-Contractor.	Amount of Bonds.	Date of Commencing Work.
1	Post Office Loop to centre Chambers St. ....	Degnon-McLean Contracting Co.	\$200,000	March 24, 1900
2	Centre Chambers St. to centre Great Jones St. ....	Degnon-McLean Contracting Co.	300,000	July 10, 1900
3	Centre Great Jones St. to centre 33d St., plus 100 ft.	Holbrook, Cabot & Daly Contracting Co.	500,000	Sept. 12, 1900
4	Centre 33d St., plus 100 ft., to centre 41st St. ....	Ira A. Shaler	150,000	Sept. 12, 1900
5-A	Centre 41st St., Park Ave. to 42d St., to Broadway, to centre 47th St. ....	Degnon-McLean Contracting Co.	200,000	Feb. 25, 1901
5-B	Centre 47th St. to centre 60th St. ....	Naughton & Co.	100,000	Sept. 19, 1900

CONTRACTS FOR CONSTRUCTION—*Continued.*

Section No.	Sub-section Limits.	Name of Sub-Contractor.	Amount of Bonds.	Date of Commencing Work.
6-A	Centre 60th St. to centre 82d St.....	William Bradley	\$350,000	Aug. 22, 1900
6-B	Centre 82d St. to centre 104th St.....			
7	Portal of Tunnel at 103d St. to centre 110th St. (Lenox Ave.).....	Farrell & Hopper	130,000	Oct. 2, 1900
8	Centre 110th St. to centre 135th St., plus 100 ft.....	Farrell & Hopper	170,000	Aug. 30, 1900
9-A	From point north of centre of 135th St. and Lenox Ave. to East Building Line of Gerard Ave. on East 149th St.....	McMullen & McBean	200,000	Sept. 10, 1901
9-B	From East Building Line of Gerard Ave. on 149th St. to point beyond Third Ave. where Steel Viaduct begins.	J. C. Rodgers	100,000	June 13, 1901
10	East Side Viaduct. From West Side Brook Avenue (Building Line) to Bronx Park and 182d St.....	Terry & Tench Construction Co. (also for Sections 12 and 15)	50,000 (for all three contracts)	Not begun
	“ “ “	E. P. Roberts (for Viaduct Foundations)	10,000	Aug. 19, 1901
11	Centre 104th St. to South Side of 125th St., plus 10 ft. on Broadway.....	John Shields	175,000	June 18, 1900
12	Manhattan Valley Viaduct. South Side (Building Line) 125th St., plus 10 ft. to North Side (Building Line) 133d St.....	Terry & Tench Construction Co. (also for Sections 10 and 15)	50,000 (for all three contracts)	Not begun
	“ “ “	E. P. Roberts (for Viaduct Foundations & Stone Piers)	See Sec. 15	June, 1, 1901



# CONTRACTS FOR CONSTRUCTION—*Continued.*

Section No.	Sub-section Limits.	Name of Sub-Contractor	Amount of Bonds.	Date of Commencing Work.
13	North Side 133d St. to centre 182d St., plus 100 ft. ....	L. B. McCabe & Brother	400,000	May 14, 1900
14	Centre 182d St., plus 100 ft., to Hillside Ave. ....	L. B. McCabe & Brother		March 27, 1901
15	West Side Viaduct. Hillside Ave. to the Terminus near Bailey Ave. ....	Terry & Tench Construction Co. (for all three contracts)	\$50,000	Not begun
	" " "	E. P. Roberts (for Viaduct Foundations)	10,000	Not begun

# CONTRACTS FOR MATERIAL.

Contract for	Name of Sub-Contractor.	Amount of Bonds.
Steel .....	American Bridge Company. ....	\$450,000
Cast Iron .....	John Fox & Company. ....	
Cement .....	United Building Material Co. ....	200,000
Asphalt, Waterproofing and Felt .....	Sicilian Asphalt Paving Co. ....	125,000

As the construction of the railway involves a reconstruction of the sewers encountered along the route, including some important outfalls, and as it was imperative that the service of these sewers should be continuous and uninterrupted by the railway work, the Contractor separated the construction of the most important of the outfall sewers from the construction of the railway, let them by special contract, and began work on them while the contractors for the railway were organizing their plant and staff.

The following tables show the location of the various sewer constructions both lateral and longitudinal; the length and character of each separate sewer; the date when each piece of work was begun; the amount of the same completed; the names of the sub-contractors, and other details:

# DETAILS OF LATERAL SEWERS.

Sewer.	Name of Sub-Contractor.	Date Begun.	Linear Feet, Length.	Size.	Linear Feet Completed.	Old Sewer Removed
Pearl and Duane Sts. ....	*Cunningham & Kearns	July 23, 1900	189' 281.5' 156' 762.5' 372'	5' cir. brick 4' 3" cir. brick 24" C. I. pipe 2' 8" x 4' brick 15" invert	189' 281.5' 156' 717.5'	150'—5' cir. brick 735'—4' cir. brick 50'—2' 8" x 4' brick 180'—3' 6" x 4' brick
			1761'		1344'	1115'
Worth Street.....	Degnon-McLean Contracting Co.	Not begun	195'	15" vit. pipe		
Leonard Street.....	Degnon-McLean Contracting Co.	Not begun	75'	15" vit. pipe		
Canal Street.....	*James Pilkington	May 7, 1900	1151' 1833' 1035' 936' 150'	4' 6" x 7' brick 6' 6" cir. bric.. 5' 6" cir. brick 4' 6" wooden 15" invert	1151' 1833' 1035' 936'	1200'—4' cir. brick 355'—3' x 4' brick 610'—2' 8" x 4' brick 970'—2' 8" x 3' 6" bk 235'—15" vit. pipe
			5105'		4955'	3370'
Marion Street.....	Degnon-McLean Contracting Co.	Jan. 29, 1901	431'	2' 8" x 4' brick	431'	431'—3' x 4' brick
Spring Street.....	Degnon-McLean Contracting Co.	Not begun	65'	15" vit. pipe		

\*Sub-contracts for sewers let independently of the sub-contracts for the railway.

# DETAILS OF LATERAL SEWERS—Continued.

Sewer.	Name of Sub-Contractor.	Date Begun.	Linear Feet Length.	Size.	Linear Feet Completed.	Old Sewer Removed.
Mulberry Street.....	*Cunningham & Kearns	May 31, 1900	227.5'	2' 8" x 4' brick	227.5'	160'—2' 8" x 4' bk
Bleecker Street.....	James Pilkington	Mar. 26, 1900	562.8' 327.2' 168'	4' cir. brick 2' 8" x 4' brick 30" C. I. pipe	562.8' 327.2' 118'	560'—4' 6" x 5' 4' bk 325'—2' 8" x 4' bk
			1058'		1008'	885
East 9th Street.....	James Pilkington	July 30, 1900	111'	18" vit. pipe	111'	
East 10th Street.....	*Cunningham & Kearns	May 31, 1900	313.1' 16'	2' 4" x 8' 6" brick 30" C. I. pipe	313.1' 16'	240'—3' 1" x 4' brick
			329.1'		329.1'	
East 22d Street.....	*Cunningham & Kearns	June 11, 1900	1978.6' 113.7' 5.5'	4' 6" cir. brick 42" C. I. pipe Brick chamber	1978.6' 113.7' 5.5'	2041'—4' x 4' 2" brick
			2097.8'		2097.8'	
East 31st Street.....	Holbrook, Cabot & Daly Contracting Co.	Sept. 23, 1901	113' 17.7'	20" C. I. pipe Brick chamber	113' 17.7'	75'—2' 7" x 4' brick
			130.7'		130.7'	

\*Sub-contracts for sewers let independently of the sub-contracts for the railway.

# DETAILS OF LATERAL SEWERS—Continued.

Sewer.	Name of Sub-Contractor.	Date Begun.	Linear Feet, Length.	Size.	Linear Feet Completed.	Old Sewer Removed.
East 41st Street.....	*James Pilkington	Dec. 28, 1901	734' 100' 407'	2' 8" x 4' brick 24" C. I. pipe 16" C. I. pipe		
			1241'			
West 45th Street.....	*James Pilkington	Jan. 21, 1901	177' 848' 117' 306'	6' 6" cir. brick 6' cir. brick 36" C. I. pipe 3' 6" x 5' 3" brick	177' 831'	190'—6' 4" cir. brick 900'—2' 8" x 4' brick
			1448'		1008'	1000'
West 54th Street.....	*Cunningham & Kearns	Oct. 3, 1900	521'	2' 8" x 4' brick	521'	480'—2' 8" x 4' brick
59th Street and Circle....	Naughton & Co.	Dec. 13, 1900	398'	15" vit. pipe	398'	
65th St. and Broadway....	William Bradley	Sept. 10, 1900	2-0' 305' 615' 1357' 128'	15" vit. pipe 18" vit. pipe 2' 4" x 3' 6" brick 2' 8" x 4' brick 30" C. I. pipe	252' 630'	415'—2' 8" x 4' brick 300'—18" vit. pipe 475'—15" vit. pipe
			2685'		932'	1190'

\*Sub-contracts for sewers let independently of the sub-contracts for the railway.

DETAILS OF LATERAL SEWERS—*Continued.*

Sewer.	Name of Sub-Contractor.	Date Begun.	Linear Feet. Length	Size.	Linear Feet Completed.	Old Sewer Removed.
72d St. and Broadway.	William Bradley	Oct. 16, 1901	696' 654'	2' 4" x 3' 6" brick 30" C. I. pipe	42'	42'—2' 4" x 3' 6" brick
			1350'			
West 81st Street.....	William Bradley	Sept. 10, 1900	114' 313'	48" C. I. pipe 6' cir. brick	114' 313'	375'—5' x 5' 8" brick
			427'		427'	
215 Broadway, East Side, 84th—86th Street.	William Bradley	Sept. 24, 1901	60' 450'	24" C. I. pipe 2' 4" x 3' 6" brick	212'	212'—2' 4" x 3' 6" brick
			510'			
West 96th Street.....	William Bradley	Not begun.	40' 76' 56'	54" C. I. pipe 30" C. I. pipe 2' 4" x 3' 6" brick		
			172'			
West 108th Street.....	*Wm. F. Norton	Sept. 12, 1900	425' 70' 98'	4' cir. brick 2' 8" x 4' brick 24" C. I. pipe	384'	384'—4' cir. brick
			593'			

\*Sub-contract for sewer let independently of the sub-contracts for the railway.

# DETAILS OF LATERAL SEWERS—Continued.

Sewer.	Name of Sub-Contractor.	Date Begun.	Linear Feet. Length.	Size.	Linear Feet Completed.	Old Sewer Removed.
West 110th Street.....	Farrell, Hopper & Co.	July 19, 1900	1116' 145' 25' 183'	6" 6" cir. brick 2' 4" x 3' 6" brick 2' 8" x 4' brick 42" C. I. pipe	1116' 145' 25' 183'	39'—2' 4" x 3' 6" bk 100'—2' 8" x 4' brick
			1469'		1469'	130'
Lenox Avenue.....	*Cunningham & Kearns.	Nov. 1, 1900	1468' 153'	5" cir. brick 4' 4" cir. brick	1468' 153'	1060'—2' 4" x 3' 6" bk 290'—2' 8" x 4' brick
			1621'		1621'	1350'
West 115th Street. . . . .	John Shields	Jan. 29, 1901	49' 526'	30" C. I. pipe 2' 4" x 3' 6" brick	49' 526'	334'—2' 4" x 3' 6" bk 216'—15" vit. pipe
			575'		575'	550'
West 124th Street.....	*Cunningham & Kearns	July 23, 1900	1220'	3' 4" x 3' 6" brick	917'	154'—2' 4" x 3' 6" bk 788'—12" vit. pipe
						942'
West 142d Street.....	*James Pilkington	Nov. 13, 1900	32' 136'	48" C. I. pipe 4' cir. brick	32' 136'	168'—4' cir. brick
			168'		168'	

\*Sub-contracts for sewers let independently of the sub-contracts for the railway.

# DETAILS OF LATERAL SEWERS—Continued.

Sewer.	Name of Sub-Contractor.	Date Begun.	Linear Feet Length.	Size.	Linear Feet Completed.	Old Sewer Removed.
149th St. and R. R. Ave. . . . .	J. C. Rodgers	Aug. 26, 1901	57.5'	14" C. I. pipe	52'	80'—5' 4" x 6' brick
			97.5'	42" C. I. pipe	97.5'	
			30'	7' x 10' brick		
			185'		149.5'	
West 157th Street. . . . .	*Alfred Bradley	July 23, 1900	392.5'	4' cir. brick	392.5'	513'—4' cir. brick
			120.5'	48" C. I. pipe	120.5'	
			69'	2' x 3' brick	69'	
			45'	2' 8" x 4' brick	45'	
			627'		627'	
Grand Totals. . . . .			26796.1'		20114.6'	15823'

\*Sub-contract for sewer let independently of the the sub-contracts for the railway.

# DETAILS OF LONGITUDINAL SEWERS—Continued.

Sewer.	Name of Sub-Contractor.	Date Begun.	Linear Feet Length.	Size.	Linear Feet Completed.	Old Sewer Removed.
Elm Street (Post Office to Great Jones Street).	Degnon-McLean Contracting Co.	Jan. 12, 1901	239'	2' 8" x 4' brick	0'	70'—3' x 4' 5" bk
			465'	2' 4" x 3' 6" brick and concrete	465'	290'—2' 8" x 4' bk
			874'	2' 4" x 3' 6" brick	46'	2005'—2' 4" x 3' 6" bk
			9'	1' 7" x 3' brick	9'	120'—15" vit. pipe
			84'	30" C. I. pipe	0'	600'—12" vit. pipe
			763'	24" C. I. pipe	128'	
			357'	18" C. I. pipe	172'	
			539'	16" C. I. pipe	114'	
			127'	6" C. I. pipe	67'	
			70'	24" vit. pipe	0'	
			1949'	18" vit. pipe	401'	
			3802'	15" vit. pipe	1391'	
			87'	8" vit. pipe	0'	
			9356'		2793'	3085'
Lafayette Place and 4th Avenue (Great Jones Street to 33d Street).	Holbrook, Cabot & Daly Contracting Co.	Jan. 7, 1901	138'	45" cir. brick	100'	630'—4" cir. brick
			442'	3' x 4' brick	0'	330'—3' 5" x 4' 6" bk
			256'	2' 8" x 4' brick	256'	95'—3' 7" x 4' bk
			859'	2' 4" x 3' 6" brick	111'	380'—3' x 4' bk
			245'	42" C. I. pipe	0'	630'—2' 8" x 4' bk
			12'	18" C. I. pipe	12'	1187'—2' 4" x 3' 6" bk
			72'	16" C. I. pipe	36'	585'—2' x 3' 4" bk
			1315'	18" vit. pipe.	567'	25'—2' 2" x 2' 9" bk
			7161'	15" vit. pipe.	2394'	150'—15" vit. pipe
						125'—12" vit. pipe
			10530'		3476'	4137'



DETAILS OF LONGITUDINAL SEWERS—*Continued.*

Sewer.	Name of Sub-Contractor.	Date Begun.	Linear Feet Length.	Size.	Linear Feet Completed.	Old Sewer Removed.
42d Street and Broadway (Park Avenue to 47th Street).	Degnon-McLean Contracting Co.	Aug. 22, 1901	666'	2' 8" x 4' brick	0'	690'—2' 8" x 4' bk
			794'	2' 4" x 3' 6" brick	30'	276'—15' vit. pipe
			486'	39' C. I. pipe	0'	429'—12' vit. pipe
			487'	16" C. I. pipe	140'	
			310'	14" C. I. pipe	0'	
			320'	18" vit. pipe	0'	
			2225'	15" vit. pipe	253'	
			5288'		423'	1388'
			152'	2' 8" x 4' brick	152'	152'—2' 8" x 4' bk
			331'	2' 4" x 3' 6" brick	330'	150'—2' 4" x 3' 6" bk
Broadway (47th to 60th Street).	Naughton & Company	Dec. 22, 1900	1095'	2' 4" x 3' 6" conc.	757'	235'—1' 7" x 3' 5" con
			230'	18" C. I. pipe	165'	1535'—15' vit. pipe
			60'	16" C. I. pipe	60'	560'—12' vit. pipe
			407'	18" vit. pipe	407'	
			3123'	15" vit. pipe	475'	
			5397'		2346'	2622'
			1105'	2' 4" x 3' 6" brick	0'	60'—18" vit. pipe
			45'	18" vit. pipe	0'	80'—15' vit. pipe
			115'	15" vit. pipe	0'	
			292'	12" vit. pipe	0'	
Broadway (60th to 104th Street).	William Bradley	Not begun	1557'		0'	140'

# DETAILS OF LONGITUDINAL SEWERS—Continued.

Sewer.	Name of Sub-Contractor.	Date Begun.	Linear Feet Length.	Size.	Linear Feet Completed.	Old Sewer Removed.
Broadway (104th Street to 125th Street).	John Shields	Aug. 26, 1901	97	2' 11" x 4' 4" bk	97	92'—2' 11" x 4' 4" bk
			94	2' 4" x 3' 6" brick	94	90'—2' 4" x 3' 6" bk
			41	18" vit. pipe	41	
			232		232	182
Broadway (from 135th Street, North).	*James Pilkington	July 15, 1901	79	2' 9" x 4' 2" brick	79	75'—2' 9" x 4' 2" bk
			67	2' 8" x 4' brick	67	63'—2' 8" x 4' bk
			155	2' 4" x 3' 6" brick	155	147'—2' 4" x 3' 6" bk
			301		301	285
Lenox Avenue (from 135th Street, South).	Farrell, Hopper & Co.	Not begun	125	2' 8" x 4' brick		
Lenox Avenue (from 135th Street, North).	J. C. Rodgers	Not begun	125	2' 8" x 4' brick		
East 149th Street.....	J. C. Rodgers	Nov. 20, 1901	700	18" vit. pipe	0	
			1425	15" vit. pipe	0	
			3520	12" vit. pipe	924	500'—15" vit. pipe
			5645		924	
Grand totals .....			38520		10495	12339

\*Sub-contract for sewer let independently of the sub-contracts for the railway.





OLIVER STREET SEWER BEING DRIVEN BY TUNNELING AT CHATHAM SQUARE BENEATH THE FOUNDATIONS OF THE MANHATTAN ELEVATED RAILWAY.

It will thus be seen that, of the lateral sewers, out of a total of 26,796.1 feet, 20,114.6 feet were completed at the close of the year 1901; and of the longitudinal sewers, out of a total of 38,526 feet, 16,495 feet were completed. The current year will see practically the whole of the above work finished. Fifteen steam outfits were installed on the work.

Of these sewers three, the Canal Street diversion, the 45th Street and 110th Street sewers, are quite large, being 6 feet 6 inches in diameter. The construction of all these sewers, but especially the large ones, has involved the ordinary difficulties of reconstructing existing sewers in a large city and a maintenance of the flow at the same time. This has been successfully accomplished in all cases.

The Canal Street diversion, on account of its size and its depth at Chatham Square, where it pierces the ridge, involved some special problems. At Chatham Square it crossed under not only a junction of busy streets, but also the electric tracks of the Third Avenue Street Railroad Company, and the elevated structure of the Second and Third Avenue divisions of the Manhattan Elevated Railroad Company. The soil at this point was a fine sand carrying water at the lower levels. It was decided by the sub-contractor that it would be advisable to tunnel this portion of the route for a distance of 221 feet. Plans for driving this tunnel were carefully worked out under the direction of the Engineer of the Sewer Division, Mr. Hendrick, aided by the engineers of the sub-contractor, Mr. Pilkington. On April 2, 1901, the flow of sewage was diverted into this sewer, thus completing its construction without disturbing the surface of the street at Chatham Square, and without causing any settlement. A plan showing the method of procedure is hereto appended.

Another field of difficult construction completed by the Sewer Division was the junction at Fifth Avenue and 110th Street, of the new 6 ft. 6 in. circular sewer on 110th Street, with the existing sewer on Fifth Avenue, whose width was 12 feet, and which at the point of junction was on a curve. An arch (20 feet 3 inches span), with a warped surface, was designed to cover the two sewers and the one from Fifth Avenue, on the south, and was successfully constructed. The situation was considerably complicated

by the presence of several large gas and water pipes and by the large amount of sewage to be handled.

In all cases it has been possible to arrange for the permanent flow of sewage without pumping, and in all cases but one without resorting to siphons. This exception is in The Bronx where the large outfall sewer along Railroad Avenue had to be lowered beneath tide level compelling the construction of a siphon. As this sewer drains a large territory the consequent great flow through it will probably render it self-cleansing, but as it has been constructed in two branches, one at a time can be readily shut off for cleaning.

In the reconstruction so far completed no accidents have occurred, no back-flooding has taken place, and the flow of all house connections, catch basins and other sewers has at all times been uninterrupted.

The actual work of beginning the railroad was dependent, first, upon the letting of the sub-contracts; secondly, on a study by each sub-contractor of the details of his respective problem; thirdly, on the organization of his own force and the procuring of the necessary plant; and, fourthly, on the construction and the delivery on the ground of the materials of construction, such as steel, etc. These several steps in a work of such magnitude as this necessarily occupied considerable time.

In order to avoid the necessity of a multiplicity of power plants at each separate point of excavation, or the losses of transmitting steam to a considerable distance, the sub-contractors, in all cases but one, decided on the erection of central-station compressed-air installations. These plants whose construction was begun immediately after the letting of the sub-contracts supplied power for the hoisting engines, drills, pumps, concrete mixers, riveters and other machines.

Following is a description of these plants installed on the various sub-sections:

#### COMPRESSOR PLANT, SECTIONS 1 AND 2.

**BUILDING.**—One building, 52'x65'.

**BOILERS.**—Two 100 H.P. boilers of Edward Burnhorn make.

Two 120 H.P. boilers of Penn. Iron Co. make.

AIR COMPRESSORS.—Two Ingersoll compressors, 250 H.P. each, cylinders, 24"x30".

AIR PIPE LAID.— 95' of 8".  
                       760' of 6".  
                       2,100' of 5".  
                       3,900' of 4".  
                       410' of 3".  
                       565' of 1.5".  
                       150' of 1".

#### COMPRESSOR PLANT, SECTION 3.

BUILDING.—One building, 36'6"x87'6"x30'3".

BOILERS.—Five 100 H.P. boilers (tubular).

AIR COMPRESSORS.—Three Ingersoll compressors, each 24"x30".

AIR PIPE LAID.—4,000' of 5".  
                       4,000' of 4".  
                       500' of 3".  
                       450 couplings (Estimated).  
                       25 air cocks (Estimated).

#### COMPRESSOR PLANT, SECTIONS 4 AND 5-4.

BUILDINGS.—Engine and compressor room, 63'x30'4"; boiler room connected, 42'4"x28'3".

BOILERS.—Two 200 H.P. boilers (Water tube).

AIR COMPRESSORS.—One Rand-Corliss compressor, class B-B-3, rated at 700 H.P. 22"x40"x48".

AIR PIPE LAID.—3,277' of 10".  
                       2,900' of 8".  
                       2,000' of 6".  
                       3,070' of 3".

#### COMPRESSOR PLANT, SECTION 5.

BUILDING.—One building, 40'x76'.

BOILERS.—Two 125 H. P. boilers (tubular).

Two 100 " " "

AIR COMPRESSORS.—Two straight line piston inlet, Class A, Ingersoll Single compressors; each rated at 192 H.P., furnishing 960 cu. ft. of free air per minute, 22"x22½"x24". Also one Ingersoll compressor, rated at 245 H.P., furnishing 1,225 cu. ft. of free air per minute, 24"x24½"x30".

AIR PIPE LAID.—1,500' of 5".  
2,500' of 4".

#### COMPRESSOR PLANT, SECTIONS 6-A AND 6-B.

BUILDING.—Wooden building, 88'x45', located west of 76th Street on the dock lands between New York Central tracks and Hudson River.

BOILERS.—Five boilers of locomotive type.

AIR COMPRESSORS.—Three Rand Class "C" straight line compressors, steam and air cylinders 24 inches diameter by 30 inches stroke, running at 90 revolutions per minute, having a combined capacity of 4,225 cu. ft. of free air per minute, which compressed to 90 lbs. requires 750 H.P.

AIR PIPE LAID.—3,895' of 8".  
2,088' of 6".  
528' of 5".  
327' of 3".  
450' of 2.5".

#### COMPRESSOR PLANT, SECTIONS 7 AND 8.

BUILDING.—Corrugated iron building on 111th Street and St. Nicholas Avenue; size 106x30x18 ft. Additional building for storage of coal, tools, etc., size 20x71 ft.

BOILERS.—Four 125 H.P. boilers, each made by the Gem City Boiler Co., Dayton, Ohio.

AIR COMPRESSORS.—Two Ingersoll compressors, each 24"x30".

AIR PIPE LAID.— 387' of 8".  
3,547' of 6".  
492' of 4".  
370' of 3".



## COMPRESSOR PLANT, SECTION 9-B.

BUILDING.—Frame building corner Gerard Avenue and East 149th Street; size 26x50x16 ft.

BOILERS.—Two boilers, 100 and 125 H.P. respectively.

AIR COMPRESSORS.—One Ingersoll compressor, 18"x24".

AIR PIPE LAID.—180' of 4".

100' of 2".

## COMPRESSOR PLANT, SECTION 11.

BUILDING.—Frame building, 22'x50'x13'.

BOILERS.—One 150 H.P. locomotive boiler.

AIR COMPRESSORS.—One Rand compressor, class "C," 24"x30".

AIR PIPE LAID.—450' of 2".

80' of 2.5".

1,200' of 3".

615' of 4".

107' of 5".

60' of 6".

104' of 7".

## COMPRESSOR PLANT, SECTIONS 13 AND 14.

BUILDING.—Corrugated iron building, situated between 162d and 163d Streets, North River; size 70x40x18 ft.

BOILERS.—Two 125 H.P. boilers, each made by the Gem City Boiler Co., Dayton, O.

Two 125 H.P. boilers, each made by the Erie Boiler Co.

One 170 H.P. N. Y. Central R. R. loco. boiler.

AIR COMPRESSORS.—Three compressors, Rand Drill Co., Steam Cylinders, 24" diam. 30" stroke, air cylinders 24" diam. 30" stroke, air capacity 1,335 cu. ft. at 85 revolutions per minute.

AIR PIPE LAID.—2,512' of 8".

3,281' of 6".

2,714' of 5".

600' of 4".

2,054' of 3.5".

5,705' of 2.5".

In order that the work should be completed within the contract time, arrangements were made to carry it on at as many points as possible, with due provision for the maintaining of an uninterrupted service of the surface railways, and the reducing of interference with the regular street traffic to the smallest limit. The details of such arrangements, being dependent upon local conditions, varied with each sub-contract, and are described below as each section is separately considered.

SECTION No. 1.—City Hall Loop, Park Row and Centre Street to centre of Chambers Street. Degnon-McLean Contracting Co., Sub-Contractors.

No work was done on this sub-contract during the year 1900. At the suggestion of the General Manager of the Construction Company studies were made looking to a change in the construction of the loop at City Hall. It was finally decided to shorten and simplify the construction at this point by having the loop turn north instead of south of the Post Office, and so arranged that local trains could all be turned around the single track loop thus laid out, passing under the express lines under Park Row without crossing at grade, or they could run along Park Row to connect with an extension south under Broadway should one be laid out. The express tracks under Park Row were planned to permit express trains to continue along a possible Broadway extension or be switched back through a "tail track." A station on the local loop line was located in the City Hall Park so as to be conveniently reached from all points and relieve the pressure that is sure to be felt at the Brooklyn Bridge station. Actual construction was begun March 24, 1901, and at the close of the year excavation for the loop beneath the Park had been completed, and the concrete walls and arched roof, with the exception of the station portion, had been put in place and partly back filled. On Park Row a trench was dug on either side of the four surface tracks (electric conduit) and carried down to grade. Cross drifts were then tunneled beneath the tracks connecting the trenches, and in these drift-timber supports erected beneath the surface tracks. Then the intervening pillars of unexcavated sand were removed and their place similarly taken by timber props. At the close of the year the



WATERPROOFING ROOF OF SUBWAY—ELM STREET.



bottom concrete had been put in place and steel delivered ready for erection. The street traffic has been concentrated in the space taken by the four surface tracks. This traffic is always heavy, especially during the early forenoon and late afternoon hours, when by actual count 300 tram cars and 400 other vehicles of various descriptions are carried per hour.

SECTION No. 2.—Centre of Chambers Street along Elm Street to centre of Great Jones Street. Degnon-McLean Contracting Co., Sub-Contractors.

With the exception of the block on Centre Street from Chambers to Reade Streets this section covered Elm Street, which, previous to the beginning of the Rapid Transit work, had been widened and cut through from Centre and Duane Streets to Lafayette Place so as to make a continuous thoroughfare. The new street had never been paved, and had never been opened for traffic; consequently the sub-contractor availed himself of the permission to take the whole width of the street so as to excavate for the entire structure. The most difficult portion of this section between Leonard and Howard Streets, where the excavation would necessarily be below tide level, had not been begun at the close of the year 1901. Work on the balance of the section was well advanced; one 30-inch gas main and one 36-inch water main were met with, which had to be moved to a new location at the side of the subway, the water main going to the East and the gas main to the West.

SECTION No. 3.—Lafayette Place from Great Jones Street to Astor Place, and Fourth Avenue from Astor Place to 100 feet north of the centre line of 33d Street. Holbrook, Cabot & Daly, Sub-Contractors.

This section, owing to the existence of rock and the presence of a double-track electric railway, and of heavy vehicular traffic on Fourth Avenue, has been one of considerable difficulty to excavate. Rock was first encountered at 10th Street, rising slowly to 15th Street, where it came directly beneath the yokes of the electric railway, and so continued to 18th Street. From 18th Street north to 33d Street it undulated considerably, but was

rarely absent entirely. In the early part of the operations the sub-contractors undertook to construct half of the railway at a time, diverting the street traffic to the other half of the street which was left entirely undisturbed. As the work progressed it was found that the inconvenience resulting from the excavation on one side of the street was felt with almost equal force upon the other, and that the building of the railway half at a time produced almost as much interference with street traffic as would the building of two railways. The sub-contractors were then permitted to excavate for the full width of the four tracks, carrying the surface tracks over the excavation, concentrating the vehicular traffic on this same space, and cutting off for the time being the direct access to the abutting houses for each block. Arrangements were made to bridge over the excavation at important buildings or to truck merchandise by hand north or south to the nearest cross street. In order to support the surface railway they placed, on the outside of the track and immediately at the side of the excavation, a pair of 24-inch rolled beams 40 feet long, and a similar pair in a trench excavated between the surface railway tracks, this latter trench afterwards being roofed over with planks. The ends of the beams were supported on wooden trestles. As the excavation progressed, timber needles or cross beams were inserted transversely beneath the surface tracks and held by rods from the longitudinal steel beams. By the aid of this arrangement it was possible to remove all the soil from beneath the surface railway and thus leave the whole space from the curb to a point beyond the centre line of the street free for the construction of the subway. The width thus secured was sufficient to put in place the centre row of columns. Water mains, gas pipes and electric subways encountered in the excavation were supported by chains from cross timbers. To remove the material of excavation an overhead cableway on towers was erected longitudinally with the excavation at each opening, or, where rock was found in quantities, a derrick was set up. Buckets on the cableway carried the spoil forward to the end of the excavation and there dumped it into carts. The means necessary for the elevation and dumping of the material thus took up no more space than the width of the excavation itself.



SECTION 3. DERRICK WITH STIFF LEG SPANNING SURFACE RAILWAY TRACK.





At Union Square where, as stated above, the surface road was laid directly upon rock, in order to avoid the possibility of crippling the surface road when blasting, it was decided to move the surface tracks to a new location nearer the easterly curb between 14th Street and 17th Street. After these tracks were moved the sub-contractors blasted out rock sufficient for the south-bound local and express tracks, and for the intermediate side track which is to be constructed at this point. At the close of the year this trench had been excavated and most of the steel structure had been erected, and it is hoped to have the surface tracks restored to their previous condition early in the coming Spring, when the excavation will be extended to the eastward sufficient to construct the north-bound express and local tracks. The local difficulties on this section in connection with the mains and sewers were considerable and variable. The problems that have so far arisen have been solved satisfactorily, which indicates that the remaining problems can be solved when they are reached. The ducts of the street railway company, which had to be maintained in service in connection with the tracks themselves, contain not only the ordinary low-tension feeders, but also high-tension cables, having a pressure of 6,500 volts each. Although in many cases the rock had to be blasted in direct contact with these ducts, it is gratifying to state that in no case have the cables been broken or the service of the road interrupted.

On other parts of Section 3 the surface railway tracks were supported in their existing location. At the outset, in conformity with the requirements of the specifications, the sub-contractors excavated from one curb to a point just beyond the centre line of the street, or sufficient to erect the structure for two tracks, the street traffic being meanwhile diverted to the space occupied by the surface railway, and to the undisturbed surface of the street on the opposite side where excavation was not in progress. It was afterwards suggested to permit the excavation to be made on both sides of the street simultaneously so that the whole four-track structure could be erected at one setting; the argument being that it would take but a little longer to complete the four tracks than it would to build two or one-half of the subway, and that the space occupied by the surface tracks would suffice temporarily for the vehicular traffic as well as for the cars. That is to say, that although the burden of interfer-

ence on each block would be greater during the progress of excavation, nevertheless the time occupied by making one large excavation would be much less than the combined time occupied by making the two smaller ones, and it is of greater importance to restrict the duration of the interference rather than the amount. Experiments were tried on one block which seemed to bear out this statement, and permission was thereupon given the sub-contractor to proceed with the excavation for the full width of the structure.

In order to support the surface railway the sub-contractors placed on the outside of the surface track and immediately at the side of the excavation, a pair of 24-inch rolled beams 40 feet long, and a similar pair in a trench excavated between the surface railway tracks, this latter trench afterwards being roofed over with planks. The ends of the beams were supported on wooden trestles. As the excavation progressed, timber needles or cross beams were inserted transversely beneath the surface tracks and held by rods from the longitudinal steel beams. By the aid of this arrangement it was possible to remove all the soil from beneath the surface railway and thus leave the whole space from curb to curb free for the construction of the subway. Water mains, gas pipes and electric subways encountered in the excavation were supported by chains from cross timbers. To remove the material of excavation an overhead cableway on towers was erected longitudinally with the excavation at each opening, or, where rock was found in quantities, a derrick was set up. Buckets on the cableway carried the spoil forward to the end of the excavation and there dumped it into carts. The means necessary for the disposal of the material thus took up no more space than the width of the excavation itself.

SECTION No. 4.—Extending under Park Avenue from a point 100 feet north of the centre line of 33d Street to the centre line of 41st Street. Ira A. Shaler, Sub-Contractor.

This section, except for a small distance at the south end, was wholly in tunnel under Murray Hill. Between 34th Street and 41st Street there existed the old surface tunnel of the Harlem Railway through which the cars of the Metropolitan Street Railway Company now pass. It was impossible to keep the four tracks of the Rapid Transit Subway in one tunnel, for if this had been



CUT IN FOURTH AVENUE, EAST SIDE OF UNION SQUARE, 15TH TO 17TH STREETS, SHOWING THE SOUTH BOUND LOCAL TRACK, SIDE TRACK AND THE SOUTH BOUND EXPRESS TRACK IN PROCESS OF CONSTRUCTION.  
METROPOLITAN STREET RAILWAY SURFACE TRACK RECONSTRUCTED TEMPORARILY ON THE EAST SIDE OF THE STREET.



tried the rise of the arched roof would have destroyed the surface tunnel. It was, therefore, decided to divide the four tracks into two two-track tunnels, and to begin the separation of these tunnels at the south end of Section 4, so that by the time 34th Street was reached there would be a core of rock between the two tunnels and immediately beneath the surface tunnel above. This intervening core varied from a minimum of 6 ft. to a maximum of 40 ft., and the shell of rock between the extrados of the subway and the foundations of the Metropolitan tunnel above from 3 ft. 9 in. to 1½ ft. The two Rapid Transit tunnels are therefore below, but at the side of the Metropolitan Street Railway tunnel. In order that these tunnels should be kept as far away from the upper tunnel as possible, the section of the roof was designed as a three-centered arch. Work was begun on this section by sinking two shafts on the south side of 34th Street; the easterly shaft being begun on September 17, 1900, and the westerly shaft on October 15, 1900, each shaft being 30 ft. long by 20 ft. wide. The east shaft reached subgrade on December 22, 1900, and the west shaft on February 16, 1901, the depth in each case being 24 ft. The east tunnel was begun on December 12 with a bottom heading, and the west tunnel on December 11 with a top heading. On December 22, 1900, a shaft was begun just south of 41st Street and Park Avenue on the west side, and on the east side on March 22, 1901, and the respective headings were begun south from these shafts on February 12 and April 16, 1901. The latter shafts were, respectively, 38 and 37.5 feet deep. It will be seen that the sub-contractor did not employ the same method of driving in the parallel headings. After an experience of a few months it was found that in good ground it was very much more economical and much more rapid to proceed with the bottom than with the top heading method. The sub-contractor therefore stopped the top heading work in the west heading from 34th Street until the bench had been removed, and then resumed progress with a bottom heading. At 41st Street the condition of affairs was found to be somewhat different. Although the rock in both cases is the normal New York rock, namely, micaceous gneiss, at 34th Street it was hard, compact and self-supporting, but at 41st Street it was found to be very soft and decomposed, and in the westerly tunnel this decomposition had proceeded so far as to reduce

the rock to the conditions of earth. The sub-contractor was therefore compelled to timber heavily; this timbering extending in the west heading for a distance of 115 ft. south and 42 ft. north, and in the east heading for a distance of 124 ft. south and 38 ft. north. In order to put this timbering in place the sub-contractor proceeded in the usual manner with a top heading. When, however, the rock was apparently strong enough to be self-supporting, permission was given to the sub-contractor to change from top to bottom heading, which permission he availed of in the west heading, but continued with a top heading on the east side.

At the commencement of the work considerable damage was done to windows of buildings surrounding the shafts at 34th Street. Although the holes were made very shallow and the charges used were very light, the rush of air out of the shaft was so great that windows were constantly broken. The Chief Engineer made a suggestion to the sub-contractor to cover the shaft mouth with heavy timbers with the hope that the air waves would be reflected back into the heading. The experiment was tried and the force of each concussion was found to be much reduced. It was then suggested to increase the depth of the hole and increase the amount of dynamite used, with the idea that the energy of the dynamite would be largely expended in the rock and not in the air. This also was found to be practicable, and later the heading work assumed more rapid progress with diminished damage and annoyance.

The progress of the four headings has been as follows:

# MONTHLY PROGRESS OF HEADINGS.

## MURRAY HILL TUNNELS.

	ADVANCE NORTH'LY.		ADVANCE SOUTHERLY.		ADVANCE NORTH'LY.	
	E. HEAD. 34th St.	W. HEAD. 34th St.	E. HEAD. 41st St.	W. HEAD. 41st St.	E. HEAD. 41st St.	W. HEAD. 41st St.
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
December, 1900.....	14	24	.....	.....	.....	.....
January, 1901.....	69	57	.....	.....	.....	.....
February.....	62	69	.....	12	.....	.....
March.....	92	73	.....	17	.....	.....
April.....	77	51	30	18	.....	.....
May.....	40	36	17	23	.....	.....
June.....	68	74	43	68	.....	5
July.....	79	52	59	70	.....	18
August.....	63	93	91	70	.....	.....
September.....	82	69	66	.....	.....	.....
October.....	98	107	93	.....	18	.....
November.....	99	97	95	57	.....	.....
December.....	111	90	56	136	.....	.....
Totals.....	954	892	550	461	18	23

Total distance between shafts, East tunnel, 1,771 feet.

Total distance between shafts, West tunnel, 1,824 feet.

SECTION No. 5-A.—From the centre of 41st Street and Park Avenue to the centre of 47th Street and Broadway. Degnon-McLean Contracting Company, Sub-Contractors.

There was considerable delay in beginning work on this section owing to negotiations with the New York Central & Hudson River Railroad Company, looking to the building of a joint station at 42d Street so as to permit the running of New York Central trains through the subway. The negotiations finally resulted in a declaration on the part of the Railroad Company to co-operate.

The general Contractor on February 11, 1901, let the contract for 42d Street to the Degnon-McLean Contracting Company, who began work on February 25.

From Madison Avenue to Broadway on 42nd Street the local conditions presented some unusual features. The profile of 42nd Street shows a ridge at Fifth Avenue, with a rapid descent both east and west. In order that the subway might have reasonable gradients it was decided to run on an unbroken gradient from Madison Avenue to Broadway, which brought the base of rail 37.5 ft. below the surface of 42nd Street and Fifth Avenue. The travel on 42nd Street is at all times heavy. In order that this travel might be interfered with as little as possible, the sub-contractors decided to concentrate their operations to the south side of the street, availing themselves of the fact that between Fifth and Sixth Avenues, Bryant Park is on the south side. Along the south side of the street, therefore, a trench was excavated for a width of about 15 feet, and in the trench so excavated the steel work was erected for the south-bound local track. A drift was then excavated at the level of the roof northerly for a distance of about 20 feet, and needle beams, consisting of 24-in. 100-lb. steel beams were placed in it, one end of the beams resting on the completed roof, the other on the unexcavated rock. On these beams the soil and street surface above were supported by blocking. Beneath the beams the rock was then excavated and the south-bound express track constructed. The side drift was then carried for another space forward, the needle beams advanced and the operation repeated. There will be found at the end of the report the plans for this ingenious method of construction. By this means the surface of the street was kept intact and traffic allowed to pass over the pavement. It has not been done,







FOURTH AVENUE—SUBWAY BEING CONSTRUCTED ON ONE SIDE OF THE AVENUE, THE OTHER SIDE BEING USED FOR TRAFFIC. MAINS AND PIPES ARE SUPPORTED BY CHAINS FROM CROSS TIMBERS.

however, without settlement, but the settlement is not serious for the moment, as it is gradual and will be easily adjusted by repaving the street and resurfacing the surface railway when the subway construction is completed.

Before the beginning of construction a large 48-inch water main existed along 42nd Street. This main was over thirty years old and liable to break easily. To provide against this catastrophe, which had it occurred would have been attended with serious results, the Contractor laid a new main in 40th Street, the expense of the laying being divided between the Rapid Transit Board and the Contractor; that is to say, one-half was paid as an extra by the Board and capitalized against the contract price, the other half being provided by the General Contractor himself. From 42nd Street northerly on Broadway the work presented no extraordinary features.

SECTION No. 5-B.—From the centre of 47th Street and Broadway to the north end of Columbus Circle at 60th Street and Broadway. Naughton & Company, Sub-Contractors.

This section was one almost wholly in rock. The sub-contractors elected to carry on their work by installing cableways, such as have been described for Fourth Avenue, and restricting the excavation to the space between the curb and the nearest rail of the surface railway, subsequently drifting laterally beneath the latter to a point just beyond the middle of the street, in which space were erected the side, quarter and centre columns and the roof beams for one-half the subway structure, according to the method suggested by the specifications. When the concrete arches had been put in place and the pavement restored, the sub-contractors then completed the operations by excavating and constructing under the remaining half of the street. In carrying out this work they elected not to support the tracks of the surface railway by trusses, but to carry them upon posts moved from time to time as occasion required. This particular contract covered no extraordinary features, except the necessity for very careful blasting around the water and gas mains, which had been originally laid directly upon the rock (in fact, in some cases trenches had been blasted for them), and except the underpinning of the Columbus Statue at Columbus Circle at the junction of Broadway,

Eighth Avenue and 59th Street. At this point there is erected a shaft monument to Christopher Columbus with a height of 75 feet, and a masonry base stepped out in the customary manner in the centre of a small grass plot. The westerly line of the subway excavation passed beneath this base, but just to the east of the centre line of the shaft itself. The sub-contractors decided to leave the shaft and its base in their position and to support them by underpinning. In order to do this the first step was the driving of a tunnel beneath the centre of the shaft and to the west of the subway wall. This tunnel was filled with masonry. The next step was to place a large girder beneath the east edge of the base, the girder being supported on timber "horses," or timber bents, north and south of the monument. The material beneath the base was then excavated, the subway structure built in place, and on top of the subway roof new foundations for the monument were carried up. When this had been done the girder was removed. The work was done with such care and skill that not even the pointing of the masonry joints in the base was disturbed.

SECTIONS NOS. 6-A AND 6-B.—From 60th Street and Broadway to 82nd Street and Broadway; and from 82nd Street and Broadway to 104th Street. William Bradley, Sub-Contractor.

The local conditions on these sections differed from any of the sub-contracts previously described. Broadway between these points is 150 ft. in width, with two sidewalks of 24 ft. each, leaving a roadway 102 ft. wide between curbs. In the centre of this roadway there exists a line of parkways 22 ft. wide, on the outside of which there is a conduit electric surface railway. The method of supporting the surface railway adopted by the sub-contractors on Section 3 was also adopted in principle on this section, but with different details. Instead of using the steel girders as on Section 3, the sub-contractor on Sections 6-A and 6-B constructed wooden through trusses, the trusses being set one on each side of each surface track. Needle beams beneath the surface railway were suspended from the trusses. The work was attacked through the parkways in open cut and then the excavation was carried laterally beneath the supporting trusses without endangering the railway. Along this part of the route the sewers and most of the gas mains were laid be-



EXCAVATION FOR SUBWAY IN PROGRESS UNDER METROPOLITAN STREET RAILWAY TRACKS, WITH TRUSSES CARRYING TRACKS DURING CONSTRUCTION.



neath the sidewalks, so that the amount of extra work of this character was but slight, the principal exception being a 30-inch water main which was found along the whole length of the work through the centre of the parkways. Instead of attempting to support this water main, the sub-contractor decided to lay a new one near the curb and then to remove the old one.

**SECTION No. 7.**—From a junction with the main line on Broadway easterly under private property to 104th Street, Central Park, to the centre of 110th Street. Farrell & Hopper, Sub-Contractors.

This section is the beginning of the east side branch, and was designed for two tracks only, and was almost wholly in deep tunnel beneath 104th Street and Central Park, except for a short distance at the northerly end where it passed beneath the driveway leading to Lenox Avenue. At the conclusion of 1901 all of the open excavation work under the park and 110th Street had been completed, and the surface entirely restored. For the tunnel portion a heading had been obtained just west of the main driveway in Central Park near Lenox Avenue, from which a heading was begun on May 14, 1901. A shaft 10 ft. by 20 ft. was begun on December 21, 1900, in Central Park, on the east side of the street known as Central Park West, at the foot of 104th Street. This shaft, whose depth was 60.5 ft. reached subgrade on June 15, 1901, and top headings were started easterly and westerly on February 28, 1901. A second shaft was started on private property, a house having been torn down for this purpose on 104th Street, 110 ft. east of Broadway on October 30, 1901. This latter shaft had an area of 12 ft. by 22 ft., and a depth of 45.8 ft., reaching a depth of 30 ft. at the end of 1901. All of the above work was done in heading only, except from the Central Park portal where bench work was kept up immediately behind the heading, the idea of the sub-contractor being to push the headings through and then to remove the bench rock from the north end. The rock for the most part was strong and sound. Good progress was made in all the headings, the rate being shown in the following table:

# MONTHLY PROGRESS OF HEADINGS.

## CENTRAL PARK TUNNEL.

MONTH.	CENTRAL PARK. SHAFT W.	CENTRAL PARK. SHAFT E.	CENTRAL PARK. PORTAL W.
	FT.	FT.	FT.
March, 1901 .....	46	53	....
April.....	68	63	....
May .....	96	24	37
June .....	46	0	63
July.....	74	73	21
August.....	170	123	34
September .....	149	119	60
October .....	160	160	73
November .....	117	137	63
December.....	165	136	63
Totals.....	1,091	888	404

Distance between 104th Street shaft and Central Park shaft, 2,162 feet.

Distance between Central Park shaft and Central Park portal, 1,725 feet.

In each of the Central Park headings two shifts of eight hours were employed, and from the portal one shift, except during September when two were used.







VIEW FROM THE NORTH PORTAL OF CENTRAL PARK TUNNEL, LOOKING TOWARDS LENOX AVENUE.

SECTION No. 8.—From the centre of 110th Street and Lenox Avenue to 100 ft. north of the centre of 135th Street and Lenox Avenue; Farrell & Hopper, Sub-Contractors, who, however, subsequently re-let the major portion of this work to John C. Rodgers.

This portion of the railway was located between the surface railway and the curb so as to avoid disturbance or support of the latter. As on Broadway most of the pipes and sewers were laid beneath the sidewalk, and as the material along the whole of this route was good sand, the impediments to rapid construction were here reduced probably to the minimum to be found anywhere along the whole of the route, the only feature to which the sub-contractor had to give special attention being the presence of ground water, as the surface of the street was but about 20 feet above tide level. The surface of the ground water was usually from two to three feet above the bottom of the excavation, but was readily kept down by pumping. At the end of the year 1901 all of the excavation on this contract had been completed except for the stations at 116th, 125th and 135th Streets.

SECTION No. 9-A.—From a point 100 ft. north of the centre of 135th Street and Lenox Avenue to the centre of Gerard Avenue in the Borough of The Bronx. McMullen & McBean, Sub-Contractors.

Owing to a possibility of a change of route in The Bronx the Contractor did not let the contract for this section until May 28, 1901, so that the beginning of work was somewhat behind that of the adjacent sections. This contract involves the building of the subway beneath the Harlem River, the requirements of the United States Government being that the top of the subway shall be at least 20 ft. below low water mark. As this was work requiring considerable plant, the sub-contractors decided that the work would be more rapidly advanced if they equipped themselves fully before beginning operations. At the conclusion of 1901 the only work done on this section was in excavation and the preparation of the plant for the Harlem River section. The work, however, is being actively pushed, is well in hand, and there is no reason to believe that this section will not be completed in ample time.

SECTION No. 9-B.—From the centre of Gerard Avenue to the west building line of Brook Avenue and Westchester Avenue. John C. Rodgers, Sub-Contractor.

This work was held back on account of the possible change of route referred to in The Bronx, and therefore the sub-contract was not sub-let until June 4, 1901. Immediately after the letting of the contract the sub-contractor began the work, and at the end of the year 1901 the work was well advanced. The character of the work is very varied, part of it being cut and cover with standard flat roof steel structure; part of it being in rock tunnel, and part of it being cut and cover work with concrete arched roof.

SECTION No. 10.—Viaduct on Westchester Avenue, Southern Boulevard and Boston Road, from Brook Avenue to Bronx Park. The sub-contract for the erecting of the steel work was given to the Terry & Tench Construction Company, and for the foundations to E. P. Roberts.

At the conclusion of the year 1901, 332 foundations had been put in place. A large portion of the designs for the viaduct structure has been delivered to the Bridge Company, and it is expected that the erection of the viaduct will commence some time during the latter part of 1902, and as this work will proceed very rapidly when it is begun, this section can be completed as soon as any of the others.

SECTION No. 11.—From the centre of 104th Street and Broadway to 10 ft. north of the south side of 125th Street on Broadway. John Shields, Sub-Contractor.

This section is the initial section of the West Side line and was designed for two tracks only. Work was commenced on that basis, and part of the structure put in place. The Contractor then suggested that a portion of the terminal space, which under the Contract he had the right to select the location for, had better be situated under Broadway immediately adjacent to the main line between 135th and 145th Streets, and that a third track be laid out to extend south from this yard to connect with the four-track system at 104th Street, thus enabling express trains to run in the direction of the burden of traffic. To permit this, a request was made to the Rapid Transit Board to order the third track as extra





FIRST ERECTION OF STEEL FRAME, BROADWAY AT 185TH STREET, OCTOBER 13, 1900.

work, the Contractor undertaking, at his own expense, to shoulder as a loss the cost of undoing such portion of the work as already had been done on Section 11. This request was granted by the Board and constitutes the most radical change that has been made in the plans, but is a change that would have had to be made at some time, and, of course, can best be made now. The original plans for Section 11 called for standard steel construction from 104th Street to the north end of the station at 116th Street, and from that point north, on account of the depth of the cut, for a two-track concrete arch section. On the addition of the third track the two-track concrete arch, which had already been largely completed, had to be removed. It was so solid, however, that blasting had to be resorted to. In order to span the three tracks, a three-centered arch of concrete, with a span of 37.5 feet, was designed, the construction of which at the end of the year 1901 was in successful progress.

SECTION No. 12.—Manhattan Valley Viaduct, from 125th Street to the north building line of 133d Street on Broadway. The sub-contractor for the erection of the steel work was the Terry & Tench Construction Company, and for the foundations, E. P. Roberts.

When the design for this structure was undertaken it was found that to carry out the contract drawings literally, which drawings called for a construction of steel towers with intervening plate-girder spans with a length 60 feet, involved a great and expensive readjusting of the junction of the surface lines on Broadway and Manhattan Street. To avoid this there was substituted for the section over Manhattan Street, a two-hinged steel arch with a span of 180 feet, plans for which were nearly completed at the conclusion of the year 1901. The foundations for the arch were then in progress, and the foundations for the towers north and south of the arch had been completed. It is expected that the erection of this viaduct will begin during the year 1902.

SECTIONS NOS. 13 AND 14.—From the north side of 133d Street to Hillside Avenue at Fort George. L. B. McCabe & Bro., Sub-Contractors.

On Section 13 the storage yard referred to above was located. The plans as finally agreed upon with the Contractor called for six tracks, in addition to the two regular tracks already contracted for,

and they are located between the north end of the station at 137th Street and the south end of the station at 145th Street. These tracks are to be used normally for storage purposes, but, of course, during the rush hours, at least one of them can be used as an additional running track for express service. The amount of storage space thus obtained will be sufficient to accommodate 150 cars. At the south end of Section 13 some of the structure had been completed previous to the decision to add the third track south from the yard to 104th Street. As in the case of Section 11, the Contractor in his agreement with the Board undertakes to assume all the expense of undoing what had been done.

From 133d Street to 150th Street, Section 13 presents no extraordinary features. The material to be excavated consists chiefly of sand and loam with some rock. At 150th Street the surface of the street rises abruptly to form the hill on the top of which is located Trinity Cemetery, with a similar sharp descent on the north side to Audubon Park. Beneath this hill the sub-contractor decided to drive a tunnel as was contemplated in the contract plans. A portal was obtained 28 ft. south of the south side of 151st Street, and a corresponding portal was obtained 55 ft. south of the north side of 155th Street, from which latter point heading work was begun on July 12, 1901. The distance between these two portals is 1,112 ft., of which, at the conclusion of the year 1901, 232 ft. of heading and 100 ft. of bench had been completed. At 155th Street it was necessary to timber the heading, the rock there being entirely decomposed. From 155th Street to 158th Street the work was done in open cut. At 9.5 feet north of the north side of 158th Street a portal was obtained for the Fort Washington Tunnel to extend northerly from there to Fort George, a distance between the two portals of 10,366.53 ft., or nearly two miles. It was decided to attack this tunnel from the portals at 158th Street and Fort George, and from two main shafts at 168th and 181st Streets, at both of the latter stations having been located.

The route as covered by the contract north from Fort George consisted of a long curve to the west from Eleventh Avenue to Kingsbridge Road, then northerly along Kingsbridge Road. It was deemed best to alter this route by continuing northeasterly from Fort George along Dykman Street to Amsterdam Avenue and then



along Amsterdam Avenue to intersect Kingsbridge Road at 218th Street. It was not, however, until near the close of the year 1901 that this change of route was effected, so that the only work that had been done at the north end was the beginning of a cut preparatory to the securing of a portal.

The heading at 158th Street was started north on September 27, 1900. The shafts at 168th Street and 181st Street were started on July 2 and July 24, respectively, and were given dimensions of 15 feet by 32 feet in the clear, in order to accommodate two passenger elevators and a stairway. At 168th Street solid rock was found close to the surface, timber framing being required for 16 feet only in order to hold securely the top ground. At 181st Street rock was met at a depth of 12 feet, and timber framing was put in for 27 feet. Both shafts were excavated for full dimensions, except that at 168th Street the first 25 feet in depth were taken out to dimensions of 15 feet by 20 feet. Subgrade at 168th Street was reached on November 7, at a depth of 103 feet, in 101 working days of two 8-hour shifts; and at 181st Street on December 15, at a depth of 126 feet, in 131 days. The cross drifts from the bottom of the shafts to the tunnel proper were laid out with a height of 25 feet and a width of 29 feet. These drifts reached the centre line of the tunnel on November 3 and December 8, respectively, whence headings north and south were at once turned. As the cross drifts were driven with top headings, they advanced simultaneously with the sinking of the shafts after the latter reached the roof grade of the heading.

All of this work was done on the top-heading plan and the rock was found, with the exception of a length of 214 feet near 160th Street, sufficiently strong to be self-supporting without timbering. In fact, at both 168th and 181st Streets the excavation was made with a width of 51 feet in order to accommodate a large arch to be hereafter constructed to cover the station, including the two tracks and the side platforms.

This work of tunnel construction was progressed up to August, 1901, with three shifts of eight hours each working continuously from Sunday midnight to Saturday midnight, and after that date with two shifts. The following table gives the distances between portal and shafts, and the progress of each heading:

# MONTHLY PROGRESS OF HEADINGS.

## FORT WASHINGTON TUNNEL.

MONTH.	158th St., N.	168th St., S.	168th St., N.	181st St., S.	181st St., N.
	Ft.	Ft.	Ft.	Ft.	Ft.
October, 1900.....	121.	0.	0.	0.	0.
November, " .....	150.	48.	33.	0.	0.
December, " .....	134.	0.	0.	38.	25.
January, 1901.....	5.5	20.	41.	6.	22.
February, " .....	0.	46.	38.	41.	41.
March, " .....	0.	39.	39.	53.	48.
April, " .....	0.	100.	89.	45.	50.
May, " .....	0.	113.	113.	98.	107.
June, " .....	0.	118.	123.	124.5	123.
July, " .....	11.	119.	94.	96.	86.
August, " .....	22.	68.	69.	72.	65.
September, " .....	61.	82.	87.	84.5	111.
October, " .....	5.	76.	83.	84.	89.
November, " .....	7.	78.	73.	89.	93.
December, " .....	25.	9.	81.	67.	75.
Totals.....	541.5	916.	961.	898.	935.

Distance from portal 158th Street to shaft 168th Street, 2,492.47 feet.

Distance from shaft 168th Street to shaft 181st Street, 3,536.06 feet.

Distance from shaft 181st Street to portal Fort George, 4,338.00 feet,

Total, 10,366.53 feet.





CONCRETE LINING, DOUBLE-TRACK ARCH. 25-FT. SPAN.

The bench work was kept up to the headings as close as possible, the amount of complete bench removed being, at the respective points, as follows:

158th Street, N. ....	494.5 feet
168th Street, S. ....	889.0 "
168th Street, N. ....	943.0 "
181st Street, S. ....	877.0 "
181st Street, N. ....	911.0 "
Total.....	4,114.5 feet

The concrete lining was begun on June 11, 1901, from 158th Street.

SECTION No. 15.—From Fort George northerly to The Bronx at Kingsbridge.

This section is wholly elevated; on which no work has yet been done except to let the sub-contracts for the erection to the Terry & Tench Construction Company, and for the foundations to E. P. Roberts.

The work done by each of the above-mentioned sub-contractors is shown in detail in the tables on pages 246, 247 and 248. The first of these tables gives the amount of work done from the signing of the contract to the close of the year 1900, and the second gives the total amount of work done from the signing of the contract to the end of the year 1901. The tables on pages 212 to 220 give the amount of work done by the sub-contractors on the sewers, which quantities are in addition to the quantities shown in the tables on pages 246, 247 and 248.

The force employed by the sub-contractors reached a maximum in October, 1901, when 7,770 men were working in the streets of New York, exclusive of the force employed at the bridge shops and elsewhere outside of the city. The staff of the Chief Engineer reached its maximum number in December, 1901, amounting to 272, consisting of 114 engineers, 76 rodmen and axemen, 72 masonry inspectors, and a clerical force of 10.

It is very gratifying to be able to report that, in the prosecution of the work, it has not been found necessary to make any radical departure from the plans originally designed, nor have any unforeseen or unexpected contingences arisen nor any conditions that were

TOTAL AMOUNT OF WORK DONE BY EACH CONTRACTOR TO DECEMBER 31ST, 1900, INCLUSIVE.

Items.	Quantity.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.	Sec. 6-A.	Sec. 6-B.	Sec. 7.	Sec. 8.	Sec. 11.	Sec. 12.	Sec. 13.	Totals.
Earth Excavation.....	Cu. Yds.	35015.	18901.	290.	19722.	7974.	16467.	5842.	6282.	10164.		14768.	135425.
Rock Excavation.....	Cu. Yds.		895.		2995.	551.	1126.		30.	5062.		7165.	18453.
Tunnelling.....	Cu. Yds.			77.								4216.	4293.
Shaft Excavation.....	Cu. Yds.							19.				5686.	5705.
Portland Cement delivered on works.....	Bbbs.				361.		150.						511.
Natural Cement delivered on works.....	Bbbs.				225.								225.
Portland Cement Concrete.	Cu. Yds.	518.	370.		102.		10.	151.		21.		447.	1619.
Natural Cement Concrete.	Cu. Yds.											1189.	1189.
Steel delivered on Docks.	Tons.	913.02	1995.9		578.262	1826.429	1097.585	176.	56.	696.85	11.	690.	7981.037
Cast Iron delivered on Docks.....	Tons.				34.157								34.157
Steel Erected.....	Tons.	9.9	25.									51.	85.9
Brick Masonry (common).	Cu. Yds.			0.8								40.	40.8
Brick Masonry (facing)...	Cu. Yds.											40.	40.
Pedestal Masonry.....	Cu. Yds.	9.75	6.4									31.	47.15
Cast Iron Water Pipe													
86-inch, laid.....	Lin. Ft.				7.								7.
Cast Iron Water Pipe													
30-inch, laid.....	Lin. Ft.				70.								70.
Cast Iron Water Pipe													
30-inch, laid.....	Lin. Ft.				618.	1 91.	2324.			3201.			7324.
Cast Iron Water Pipe													
12-inch, laid.....	Lin. Ft.				317.	129.	35.						481.
Cast Iron Water Pipe													
6-inch, laid.....	Lin. Ft.					38.	32.						70.
Cast Iron Gas Pipe													
12-inch, laid.....	Lin. Ft.				150.								150.
Cast Iron Gas Pipe													
20-inch, laid.....	Lin. Ft.				496.								496.
Wrought Iron Gas Pipe													
4-inch, laid.....	Lin. Ft.				250.								250.
Wrought Iron Gas Pipe													
6-inch, laid.....	Lin. Ft.				240.								240.
Tile Drain 18-inch, laid..	Lin. Ft.							175.				417.	592.
Waterproofing.....	Sq. Yds.	109.2	759.		146.							1126.	2132.2
Average number of men employed.....		311	287	77	501	140	181	88	62	172		314	2233

TOTAL AMOUNT OF WORK DONE BY EACH CONTRACTOR TO DECEMBER 31, 1901, INCLUSIVE.

ITEMS.	Quantity.	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5-A.	Sec. 5-B.	Sec. 6-A.	Sec. 6-B.	Sec. 7.	Sec. 8.	Sec. 9-A.	Sec. 9-B.	Sec. 10.	Sec. 11.	Sec. 12.	Sec. 13.	Sec. 14.	Sec. 15.	TOTALS.
Earth Excavation.....	Cu. Yds.	30812.	150631.	190523.	686.	22750.	68729.	62200.	117200.	8805.	101440.	45315.	33950.	4911.	40405.	2787.	50425.	894.	.....	987876.
Rock Excavation.....	Cu. Yds.	.....	.....	54163.	2466.	39542.	56564.	38873.	35413.	4116.	42.	3608.	3098.	308.	47109.	125.	32494.	85.	.....	315556.
Tunneling.....	Cu. Yds.	.....	.....	.....	43229.	.....	.....	.....	.....	10312.	.....	.....	.....	.....	.....	.....	65255.	13281.	.....	141077.
Shaft Excavation.....	Cu. Yds.	.....	.....	.....	.....	.....	.....	.....	.....	309.	.....	.....	.....	.....	.....	.....	5086.	.....	.....	5995.
Portland Cement Concrete	Cu. Yds.	3275.	16110.	19135.	.....	3800.	11801.	5560.	9102.	2540.	16325.	.....	1798.	2207.	3074.	756.	5660.	.....	.....	101032.
Natural Cement Concrete.	Cu. Yds.	.....	.....	.....	.....	.....	39.	.....	.....	.....	.....	.....	.....	.....	.....	805.	1680.	.....	.....	2524.
Steel erected.....	Tons.	9.	2217.	2207.	.....	915.854	1283.484	581.	856.214	182.	1408.	.....	187.	.....	35.	.....	117.	.....	.....	9388.532
Cast Iron erected.....	Tons.	.....	32.	26.	.....	.....	55.099	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	113.699
Brick Masonry (common).	Cu. Yds.	19.	808.	962.	.....	299.	719.	278.	419.	164.	1374.	.....	110.	.....	79.	.....	137.	.....	.....	5448.
Brick Masonry (facing)...	Cu. Yds.	.....	.....	.....	.....	.....	205.	.....	.....	23.	.....	.....	.....	.....	.....	.....	40.	.....	.....	40.
Brick Masonry (enameled)	Cu. Yds.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	288.
Pedestal Masonry.....	Cu. Yds.	4.	308.	881.	.....	70.	234.	99.	165.	17.	156.	.....	28.	166.	17.	49.	64.	.....	.....	1753.
Cut Stone Masonry.....	Cu. Yds.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.	78.	.....	91.
Maintaining R. R. Track..	Lin. Ft.	.....	.....	2602.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2002.
Restoring Street Surface	Sq. Yds.	.....	.....	1241.	.....	.....	2624.	.....	.....	181.	2547.	.....	.....	.....	.....	196.	2046.	.....	.....	8835.
Restoring Park Surface	Sq. Yds.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1580.
and repaving.....	Sq. Yds.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31152.977
Steel delivered on Docks..	Tons.	1040.	4447.	6316.	.....	2548.036	2848.103	4673.	3253.038	182.	2530.	.....	351.	.....	1770.	11.	1082.	.....	.....	.....
Cast Iron delivered on	Tons.	.....	57.	185.	.....	.....	92.491	24.	40.932	.....	34.	.....	.....	.....	63.	.....	.....	.....	.....	496.429
Docks.....	Tons.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portland Cement delivered	Bbls.	.....	.....	.....	.....	.....	19111.	2397.	10315.	.....	.....	.....	.....	2525.	.....	.....	.....	.....	.....	34948.
on work.....	Bbls.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Natural Cement delivered	Bbls.	.....	.....	.....	.....	.....	2665.	.....	175.	.....	.....	.....	.....	125.	.....	.....	.....	.....	.....	2965.
on work.....	Bbls.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Waterproofing.....	Sq. Yds.	4997.	35196.	42418.	.....	7540.	26008.	13012.	21499.	6475.	46214.	.....	5379.	.....	7461.	.....	7714.	.....	.....	234538.
Cast Iron Water Pipe,	Lin. Ft.	.....	.....	.....	.....	3489.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3489.
48-inch, laid.....	Lin. Ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cast Iron Water Pipe,	Lin. Ft.	.....	3050.	333.	.....	519.	7.	927.	1063.	.....	.....	.....	.....	.....	.....	.....	811.	.....	.....	6030.
36-inch, laid.....	Lin. Ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cast Iron Water Pipe,	Lin. Ft.	.....	.....	.....	.....	.....	357.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	857.
30-inch, laid.....	Lin. Ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cast Iron Water Pipe,	Lin. Ft.	.....	97.	40.	.....	1201.	1268.	4572.	5861.	110.	.....	.....	.....	.....	4456	.....	23.	.....	.....	17738.
20-inch, laid.....	Lin. Ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TOTAL AMOUNT OF WORK DONE BY EACH CONTRACTOR TO DECEMBER 31, 1901, INCLUSIVE—Continued.

ITEMS.	Quantity.	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5-A.	Sec. 5-B.	Sec. 6-A.	Sec. 6-B.	Sec. 7.	Sec. 8.	Sec. 9-A.	Sec. 9-B.	Sec. 10.	Sec. 11.	Sec. 12.	Sec. 13.	Sec. 14.	Sec. 15.	TOTALS.
Cast Iron Water Pipe, 16-inch, laid.....	Lin. Ft. ....					12.														12.
Cast Iron Water Pipe, 12-inch, laid.....	Lin. Ft. ....		1209	1438.		78.	805.	340.	449.								11.			4489.
Cast Iron Water Pipe, 6-inch, laid.....	Lin. Ft. ....		307.	1583.		222.	188.	91.	145.				1890.							4426.
Cast Iron Water Pipe, 4-inch, laid.....	Lin. Ft. ....					29.	88.													117.
Gas Pipe, 30-inch, laid.....	Lin. Ft. ....		1630.																	1452.
Gas Pipe, 24-inch, laid.....	Lin. Ft. ....			400.																400.
Gas Pipe, 20-inch, laid.....	Lin. Ft. ....			42.		957.	816.			110.	64.									1289.
Gas Pipe, 16-inch, laid.....	Lin. Ft. ....		85.								50.									135.
Gas Pipe, 12-inch, laid.....	Lin. Ft. ....			204.			150.													351.
Gas Pipe, 8-inch, laid.....	Lin. Ft. ....		858.	2821.																3679.
Gas Pipe, 6-inch, laid.....	Lin. Ft. ....		50.	2852.			380.				807.									5089.
Gas Pipe, 4-inch, laid.....	Lin. Ft. ....		103.	2855.			250.				378.									3586.
Tile Drain, 12-inch, laid ..	Lin. Ft. ....			481.				60.	29.	456.	139.				142.		635.			1860.
Tile Drain, 10-inch, laid ..	Lin. Ft. ....			1174.		357.	1640.	1024.	1187.						456.		6.			5844.
Tile Drain, 8-inch, laid ..	Lin. Ft. ....			1351.		405.	661.	895.	911.						483.		289.			5028.
Tile Drain, 6-inch, laid ..	Lin. Ft. ....			1443.		933.	1244.	258.	1770.		170.				54.		74.			5066.
Tile Drain, 4 inch, laid ..	Lin. Ft. ....						682.	630.	1217.											2529.
Tile Drain, 3½-inch, laid ..	Lin. Ft. ....			571.																571.
Tile Drain, 3-inch, laid ..	Lin. Ft. ....			1068.		444.				98.					530.		1172.			3312.
Mail Tubes, 8 inch. ....	Lin. Ft. ....		484.	3404.																3888.
Edison Ducts, 2 and 3-inch	Lin. Ft. ....		2408.	5520.																7928.
Empire City Ducts .....	Lin. Ft. ....		85.	22074.																22159.
Empire City Blow Pipe, 8-inch .....	Lin. Ft. ....			1086.																1086.
Fire Alarm Ducs.....	Lin. Ft. ....			198.																198.
Telephone, Telegraph and Electric Light Subways.	Lin. Ft. ....			4145.																4145.
Subways, 12-inch x 12-inch.	Lin. Ft. ....			1205.																1205.
Ducts, laid.....	Lin. Ft. ....		200864.	209809.		61303.	196997.	98940.	145396.	32934.	225057.									1320500.
Average number of men employed.....		59	302	1057	306	590	925	540	600	205	373	226	219	90	220	23	584	88		6607.







CONCRETE-LINED THREE-TRACK ARCH; 37.5-FT. SPAN. DOUBLE-TRACK ARCH, 25-FT. SPAN, IN THE BACKGROUND, BEING REMOVED TO PROVIDE FOR THREE TRACKS.

not foreseen and provided for. In the matter of design the only change that has been made has been to omit the foundation stones beneath the side-wall columns and to lengthen these columns six inches in order that their feet may be thoroughly imbedded in the bottom concrete so as to hold them securely in position to withstand the thrust of the soil behind, and thus develop the full strength of these columns as vertical beams. In order that the approaches to the Harlem River Tunnel should be thoroughly waterproofed, it was finally decided to use both methods of waterproofing as described in the specifications, namely, the alternate layers of asphalt and felt, and bricks laid in asphalt. A cross-section of the approach is appended to the report showing the bricks in asphalt laid against felt with asphalt and backed on both sides with concrete. At the close of the year 82 feet of such invert had been turned on which considerable side-wall had been erected.

The important general changes in plans have been the changing of the terminal loop from its original location around the Post Office at the south end to one wholly within the limits of City Hall Park and Mail Street, and the making of the loop with a single track for local trains only instead of a double track as originally planned, arrangements being provided for the switching back of the express trains on a central tail-switching track under Park Row; the location of the yard on Broadway between 137th and 145th Streets; and the third track on the west side from 104th to 137th Streets, as described above. Other and minor changes have been the addition of an extra siding south of the Spring Street station; the lengthening of express station platforms to 350 feet in order to accommodate longer trains; and the laying in 40th Street from Seventh Avenue to Park Avenue, of a new 48-inch water main to take the place of the old 48-inch water main on 42d Street.

Subsequent to the letting of the contract the Board directed the Contractor to construct pipe galleries along Elm Street for such additional mains and pipes that might be laid in the future. After this work had been begun objection was made by the Departments of Sewers and Water Supply against the construction of this gallery, whereupon the Board rescinded the above-mentioned order. Work to the extent of the estimated cost of \$38,000 had been done on these galleries, part of which was represented by additional ex-

cavation and concrete, which expense the Contractor voluntarily assumed, and part by extra steel work which had been manufactured and delivered. This steel, however, has been already used to a large extent in other parts of the structure and so not lost.

Although the Contract gave to the Contractor the option of making the working drawings himself, subject to the approval of the Board, or permitting the drawings to be worked out in detail under the direction of the Board's Chief Engineer, it was decided as being generally more desirable that the latter course should be pursued, even to the designing of the details of the stations. All details have, therefore, been worked out by the draughting department, under the supervision of Mr. St. John Clarke. Drawings when thus completed have been forwarded to the Contractor, who, in turn, has sent them to the sub-contractor for steel, accompanied by the Contractor's orders. The sub-contractor for steel then prepared the requisite shop drawings, sending the same to the Contractor, who forwarded them to the office of the Chief Engineer for examination and approval. In this way every drawing has had a double check.

At the close of the year 1901 drawings for the following amount of structure, as expressed in linear feet, had been officially approved :

# LINEAR FEET OF STRUCTURE FOR WHICH DRAWINGS HAVE BEEN APPROVED.

DRAWINGS.	SUB-SECTIONS.															TOTAL.			
	1	2	3	4	5a	5b	6a	6b	7	8	9a	9b	10	11	12		13	14	15
STEEL.																			
R. T. Commission ...	965	5320	3905	....	1730	1100	2145	2925	200	2395	....	1100	3820	4020	2165	3180	.....		34980
R. T. Sub. Constr'n Co.	410	5590	7540	....	2590	3325	6345	4650	480	6095	....	985	....	3315	....	3050	.....		44315
American Bridge Co.,	965	5590	7540	....	3640	3635	3345	5070	480	6735	532	1100	....	4020	1700	3145	.....		50432

NOTE.—"R. T. Commission" denotes drawings prepared in the Chief Engineer's Office supplementary to the Contract Drawings; "R. T. Sub-Contr'n Co." denotes drawings prepared by General Contractor from R. T. Commission drawings; "American Bridge Co." denotes detailed shop drawings prepared by Sub-Contractor.

MASONRY.																			
Arch Tunnel.....	720	....	2000	.....								2190	....	900	....	600	.....		6410
Tubular Tunnel.....												450	.....						450
Viaduct Approach.....														715	....	460	.....		1175

Comm. Drawings.

In addition to the above drawings officially approved, a still greater amount of work had been done by the draughting department in the making of studies; in the preparation of designs not yet officially approved, and in the drawing of maps, profiles and other similar work.

The Department of Inspection of Material was organized by appointing Mr. W. A. Aiken as General Inspector, who established his headquarters at Pittsburg, on August 5, 1900. The work of this department has been the inspection and testing of all materials entering into the work. A laboratory has been fitted up at the Homestead Mills of the Carnegie Steel Company in charge of Mr. R. L. Oberholser, where complete check determinations on every melt of steel, and analyses of all cements, as well as shop and field paints, and asphalts, are made.

Steel was rolled at the various points indicated below, and manufactured at the shops of the American Bridge Company, at Keystone, Pencoyd, Athens and Trenton. The total weight of steel accepted at the various mills during the years 1900 and 1901, respectively, was as follows:

	1900.	1901.
Carnegie Steel Co.....	29,403,709 lbs.	28,586,848 lbs.
Pencoyd Iron Co.....	3,314,910 lbs.	14,613,865 lbs.
Oliver Iron & Steel Co.....	209,987 lbs.	280,412 lbs.
Park Steel Co.....	94,850 lbs.	54,739 lbs.
Lukens Iron & Steel Co.....	—————	96,710 lbs.
Bethlehem Steel Co.....	—————	36,125 lbs.
Cambria Iron & Steel Co.....	—————	3,140 lbs.
Totals .....	33,023,456 lbs.	43,671,839 lbs.
Total steel rolled to date.....		76,695,295 lbs.

The specifications state that the steel should be manufactured by the open hearth process and meet the following requirements:

	ULTIMATE STRENGTH, LBS.	ELASTIC LIMIT, LBS.	ELONGA- TION, PER CENT.	REDUCTION OF AREA, PER CENT.
Medium steel..	58,000 to 66,000	33,000	20	44
Rivet steel....	50,000 to 58,000	28,000	27	54
Phosphorus not to exceed .04%.				

In order to ascertain that the steel, as rolled, complied with the specifications, 2,621 specimens of steel, representing 1,269 different heats, were tested during the year 1900. The results of all accepted tests show—

28% or 731 tests, giving an average minimum ultimate strength per square inch between 58,000 and 60,500 lbs.....	59,750 lbs.
12% or 302 tests, giving an average maximum ultimate strength per square inch between 63,500 and 66,000 lbs.....	64,490 lbs.
60% or 1,522 tests, giving average ultimate strength per square inch approximating average of specifications (62,000).....	61,720 lbs.

The average *elastic limit* of all the above tests showed 38,630 lbs. per square inch, as against the specification requirement of 33,000 lbs. In only one instance did the material fail in this respect.

The average *elongation* of all the above tests showed 28.9%, as against 20% of the specifications.

The average *reduction of area* of all the above tests showed 55.7%, as against 44% of the specifications.

Forty-nine heats were retested, having originally partially failed. Of these 32 were finally accepted and 17 rejected.

During the year 1901, 6,255 specimens of steel were tested, representing 3,033 different heats. The results show:

36% or 2,123 tests, giving an average minimum ultimate strength per square inch between 58,000 and 60,500 lbs.....	59,570 lbs.
10% or 586 tests giving an average maximum ultimate strength per square inch between 63,500 and 66,000 lbs.....	64,780 lbs.
54% or 3,178 tests giving average ultimate strength per square inch approximating average of specification (62,000).....	61,660 lbs.

The average *elastic limit* of all tests, both accepted and rejected material, showed 38.130 lbs. per square inch as compared with specification requirement of 33,000 lbs. minimum.

The average *elongation* of all the above tests showed 28.23% as compared with specification requirement of 20% minimum.

The average *reduction of area* of all the above tests showed 53.4% as compared with the specification requirement of 44% minimum.

Ninety-nine heats were retested, having originally partially failed. Of these, 87 were finally accepted and 12 finally rejected.

Finished work was manufactured at the various branches of the American Bridge Company, as shown below, and there were shipped during the year 1900 and 1901, respectively, the following amounts:

	1900.	1901.
Keystone Branch.....	19,896,138 lbs.	18,324,396 lbs.
Penneyd Branch.....	371,476 lbs.	10,270,438 lbs.
Athens Branch.....	—————	10,763,341 lbs.
Trenton Branch.....	—————	5,793,040 lbs.
Totals .....	20,627,614 lbs.	45,151,215 lbs.
Total steel manufactured to date.....		65,418,829 lbs.

The specifications of the Board required that the weight of finished material must not fall below the estimated weights, as computed from the drawings, by more than 2.5 per cent., and the Contractor in his contract with the American Bridge Company imposed a similar restriction as to the excess of weight. Up to the close of the year 1901, the weights of material on all drawings on which the work as called for had been finished in the shops show shipped weights amounting to 35,769,001 lbs., estimated weights 35,780,514 lbs., or an average deficiency of only .03 of 1%.

The total weight of cast-iron for pipes and station columns, inspected and passed at the various foundries during the years 1900 and 1901, respectively, amounted to:

	1900.	1901.
Warren Foundry & Machine Co., pipe .....	1,325,301 lbs.	4,540,511 lbs.
Reading Foundry Co., pipe.....	200,021 lbs.	1,754,093 lbs.
Donaldson Iron Co., pipe.....	—————	174,281 lbs.
Foran Foundry & Mfg. Co., struc- tural material.....	68,314 lbs.	988,305 lbs.
Totals .....	1,593,636 lbs.	7,547,190 lbs.
Total cast-iron inspected to date.....		9,050,826 lbs.







FOUR-TRACK STRUCTURE COMPLETE BETWEEN BLEECKER AND HOUSTON STREETS.

In addition to the above, during the year 1900, there were inspected and rejected 291,011 lbs. of cast material, and 1,205,596 lbs. inspected and rejected during 1901.

There were made on cast material 181 tension tests showing an average of 25,951 lbs. ultimate strength as compared with the specification requirement, "material to stand from 18,000 to 24,000 lbs. per square inch." 180 transverse tests, on pieces one inch square and 36 inches long between supports, showed ability of test piece to bear an average load of 878 lbs. as against 750 lbs. called for by the specifications. There was no rejection of cast-iron material through failure to comply with the specifications' physical requirements.

The Contractor having placed a sub-contract for all of the cement with the American Cement Company, whose works are located at Egypt, Pa., the Board established there a testing laboratory under the direction of the General Inspector of Material, who placed Mr. R. Frank Walker in charge. The laboratory was equipped with two cement testing machines, boiling and steaming apparatus, and all other appliances necessary to determine the strength, soundness and suitability of the cement offered by the manufacture. The specifications required that the cement shall not fall below the following standard:

#### PORTLAND CEMENT.

##### *Fineness.*

98 per cent. shall pass a No. 50 sieve, and 90 per cent. a No. 100 sieve.

##### *Tensile Strength.*

NEAT.—At the end of one day in water after hard set, 150 pounds. At the end of seven days, one day in air, 6 days in water, 400 pounds. At the end of 28 days, one day in air, 27 days in water, 500 pounds. When mixed 2 to 1 with quartz sand, at the end of seven days, one day in air, six days in water, 200 pounds; at the end of 28 days, one day in air, 27 days in water, 300 pounds.

#### NATURAL CEMENT.

##### *Fineness.*

95 per cent. shall pass a No. 50 sieve, and 85 per cent. a No. 100 sieve.

##### *Tensile Strength.*

At the end of seven days, one day in air, six days in water, 125 pounds. At the end of 28 days, one day in air, 27 days in water, 200

pounds. When mixed 1 to 1 with quartz sand, at the end of seven days 100 pounds; at the end of 28 days, one day in air, 27 days in water, 150 pounds.

#### CHEMICAL ANALYSES AND SOUNDNESS.

Chemical analyses will be made from time to time, and cement furnished must show a reasonably uniform composition.

Tests for soundness will be made as follows:

##### *Portland Cement.*

Tests for checking and cracking and for color will be made by moulding on plates of glass cakes of neat cement about 3 inches in diameter, one-half inch thick in the centre, and with very thin edges. One of these cakes when set perfectly hard shall be put in water and examined for distortion or cracks, and one shall be kept in air and examined for color, distortion and cracks. Another cake shall be allowed to set in steam for twenty-four hours and then put in boiling water for twenty-four hours. Another cake shall be allowed to set hard in dry air for twenty-four hours and then put in boiling water for twenty-four hours. Such cakes should at the end of the tests still adhere to the glass and show neither cracks nor distortion.

A briquette, in like manner, should be allowed to set hard in dry air for twenty-four hours, then boiled for twenty-four hours, be kept for five days in water and show 350 pounds tensile strength.

##### *Natural Cement.*

Pats should be made on plates of glass, in the same manner as for Portland cement, and tested for cracking, distortion and color, except that the boiling test will be omitted. Tests for setting will be made in accordance with requirements of the work as fast as slow-setting cement is needed.

In order to inspect the cement it was, as soon as manufactured, placed in bins holding about 1,400 barrels each, whence samples were taken and briquettes made. Until the briquettes were broken for the 28-day period (unless the cement were sooner rejected), the cement was held in these bins. After acceptance the cement was packed in bags, each bag being closed with a lead seal, and thus shipped to the work. During the year 1900, there were shipped 42,000 barrels of Portland, and 5,000 barrels of Natural cement, involving the breaking of 3,102 briquettes; and during 1901, 148,420 barrels of Portland, and 10,920 barrels of Natural cement, involving the breaking of 27,909 briquettes, with the following results:

# BRIQUETTES.

## PORTLAND CEMENT, NEAT.

Year.	Broken.	Passed.	Failed.
1900	1827	1733	94
1901	15006	15560	46

## PORTLAND CEMENT, SAND.

Broken.	Passed.	Failed.
726	698	28
10671	10654	17

## NATURAL CEMENT, NEAT.

Year.	Broken.	Passed.	Failed.
1900	411	363	48
1901	750	750	0

## NATURAL CEMENT, SAND.

Broken.	Passed.	Failed.
138	134	4
882	882	0

The average results obtained from these tests were:

## PORTLAND CEMENT.

Year.	NEAT.	1 DAY.	7 DAYS.	28 DAYS.
1900	Average Result.....	229 lbs.	582 lbs.	714 lbs.
1901	" " .....	300 lbs.	645 lbs.	763 lbs.
	Specification Requirement...	150 lbs.	400 lbs.	500 lbs.

Year.	SAND, 2 TO 1.	1 DAY.	7 DAYS.	28 DAYS.
1900	Average Result.....		276 lbs.	434 lbs.
1901	" " .....		380 lbs.	525 lbs.
	Specification Requirement..		200 lbs.	300 lbs.

## NATURAL CEMENT.

Year.	NEAT.	1 DAY.	7 DAYS.	28 DAYS.
1900	Average Result.....		172 lbs.	249 lbs.
1901	" " .....		215 lbs.	322 lbs.
	Specification Requirement.....		125 lbs.	200 lbs.

Year.	SAND, 1 TO 1.	1 DAY.	7 DAYS.	28 DAYS.
1900	Average Result.....		118 lbs.	215 lbs.
1901	" " .....		218 lbs.	350 lbs.
	Specification Requirement...		100 lbs.	150 lbs.

In the making of tests, in addition to the ordinary boiling tests, the specifications called for briquettes to be allowed to set hard in dry air twenty-four hours, then boiled for twenty-four hours, be kept for five days in water, and show 350 lbs. tensile strength, as against the requirement of 400 lbs. for briquettes not boiled. The average results of such boiling tests showed that the boiled briquettes gave 670 lbs. as against an average of 645 lbs. for the briquettes not boiled. The experiments to date seem to indicate that briquettes boiled and then broken immediately after being cooled in water show approximately the same good results as when boiled and kept five days in cold water, which is the general custom prescribed by the specification.

The work done by the Department of Inspection of Material in testing cements has been exceedingly good. By locating the laboratory at the works and thus watching the manufacture of the cement from the quarry to the barrel, it has been possible to make many suggestions to the manufacturers, that resulted in a better and more regular product. In this inspection the manufacturer has cheerfully co-operated, and has been so impressed with the success of careful, scientific examination that he has supplemented our chemical laboratory with an additional one of his own. Investigations relating to the proper temperature in the burning of the cement have now been undertaken, and it is hoped will lead to still better results. The special quality of cement obtained was largely the result of a ruling requiring a specific ratio of increase in tensile strength from 7 to 28 days, and furthermore that cement showing as high as 750 lbs. at the earlier stage should be generally refused as unlikely to give good results in long-time tests.

The practical outcome of our close inspection has been the obtaining of a much higher grade of cement, as shown in the above tables, where it will be seen that during the year 1900, out of 3,102 briquettes, 174 failed, while during 1901, out of 27,909 briquettes, only 63 failed, with a decided increase in the average results at every period of tests for both Portland and Natural cement, whether neat or with sand.

During the year 1901 the Board appointed Messrs. Heins & La Farge as Consulting Architects, and Messrs. Dunnean and Hutehinson

son as Consulting Electrical Engineers. Since their appointment the architects have been busily engaged preparing the designs for the interior decoration of the stations, many of which designs it is expected will be carried into execution during the current year. The Electrical Engineers have reported to the Chief Engineer, who, in turn, has reported to the Board that the general plans for the equipment, as submitted by the Contractor, meet the requirements of the Contract. These plans, so far as decided on, include the erection of a power house on the block between 58th and 59th Streets and Eleventh and Twelfth Avenues, in which there are to be installed eight engines and eight generators having a capacity of 5,000 kilowatts each under normal conditions, or 7,500 kilowatts under overload conditions; the combined output ranging, therefore, from 40,000 to 60,000 kilowatts, requiring from 60,000 to 90,000 indicated engine horse-power.

The sub-contracts for the engines have been let to the Allis-Chalmers Company; for the generators and exciter outfits, to the Westinghouse Electric & Manufacturing Company; and for the boilers, to the Babcock & Wilcox Company.

Unfortunately it is inevitable that work of this magnitude should be attended by accidents. During the years 1900 and 1901, the most serious accident that occurred was a fall of rock in the south heading of the shaft at 168th Street, resulting in the injury of two and the death of five workmen. The Coroner's inquest that immediately followed entirely exonerated the sub-contractor and the foreman in charge of all blame.

During the year 1900 the total of casualties was 35, of which 27 related to workmen and 8 to outsiders. During the year 1901, on account of the larger number of men employed and the greater extent of work open, the casualties increased to 176, of which 156 befell workmen, 3 the engineering staff, and 17 persons not connected with the work. During the two years, 16 of the above accidents were fatal, 15 being workmen, and one a bystander, the latter accident being due entirely to personal carelessness.

The design for the railway contemplates a track structure without ballast, the rail being fastened to a continuous wooden support, the latter resting on the concrete composing the floor. In order that

this idea—somewhat novel in railway construction—should be thoroughly tested, William H. Baldwin, Esquire, President of the Long Island Railroad, courteously permitted the relaying of one-quarter mile of the main line of the Long Island Railroad, near Jamaica, Long Island, on this principle, the expense of the experiment being borne by the Contractor. Several types of track have been laid and put into regular service. It is proposed to let these types remain and test their durability practically. At the close of the year sufficient time had not elapsed to express any opinion as to the result of the test.

From the Auditor's report it will be seen that disbursements on account of "construction," during the years 1900 and 1901, amounted to \$12,190,000; and that the disbursements on account of "engineering," for the same period, amounted to \$509,305.53. This last figure covers the disbursements for salaries, rent, furniture and supplies, and all other expenses in connection with the Engineering Department, including the maintenance of the Department of Tests at the Steel and Cement Works. The cost of supervising the work to date has, therefore, been about 4 per cent.

It is with great pleasure that the Chief Engineer avails himself of this opportunity to record the faithful and conscientious work rendered by all members of the Engineering Department, and also his personal appreciation of the services of the Division Engineers and the General Inspectors and those members of the staff with whom he comes in personal contact.

Respectfully submitted,

WM. BARCLAY PARSONS,

*Chief Engineer.*



REPORT  
OF THE  
AUDITOR



CITY OF NEW YORK,  
BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS.

Auditor's Office, January 1, 1902.

*The Honorable Board of Rapid Transit Railroad Commissioners:*

GENTLEMEN:—I have the honor to submit herewith a report of the Auditor in relation to the finances of the Board of Rapid Transit Railroad Commissioners, for the period June 18, 1894, to December 31, 1901, giving in general and in detail a—

(Folios 265 and 266). Statement showing the requisitions made upon the Board of Estimate and Apportionment for the authorization for the issue of Revenue Bonds for the requirements of the Board of Rapid Transit Railroad Commissioners, from June 18, 1894, to December 31, 1901.

(Folio 267). Statement showing the Appropriations made by the Board of Estimate and Apportionment for the purposes of the Board of Rapid Transit Railroad Commissioners, from June 18, 1894, to January 14, 1902.

Statements showing the Disbursements of the General Fund made under the direction of the Rapid Transit Board, from June 18, 1894, to December 31, 1901, viz.:

(Folio 268). Administrative and General Office.

(Folio 269). Engineering.

(Folios 270 and 271). Legal, and a Summary of General Fund Disbursements.

(Folios 272, 273, 274, 275, 276, 277, 278 and 279.) A Transcript of general information relative to the Contract and Construction. Bonds and Sureties.

(Folio 280). Statement showing the issues of Corporate Stock of the City of New York from June 25, 1900, to December 31, 1901, the proceeds thereof to be applied to the construction of the Rapid Transit Railroad.

(Folio 281). Statement showing the requisitions made upon the Board of Rapid Transit Railroad Commissioners, and the payments made under the direction of the said Rapid Transit Board to *John B. McDonald, Contractor*, for work done and materials furnished under contract dated February 21, 1900, for the construction and operation of the Rapid Transit Railroad of the City of New York from February 21, 1900, to December 31, 1901.

(Folio 282). Statement showing the requisitions made upon the Board of Rapid Transit Railroad Commissioners, and the payments made under the direction of the said Rapid Transit Board to *John B. McDonald, Contractor*, for Extra Work done and materials furnished under contract dated February 21, 1900, for the construction and operation of the Rapid Transit Railroad of the City of New York from May 2, 1901, to December 31, 1901, in accordance with the resolution of the Board adopted May 2, 1901, providing for the construction of a third track on the portion of the route extending along the Boulevard (now Broadway) from 103d to 137th Streets in accordance with an agreement between the Contractor and the City, and the sureties to the said contract of February 21, 1900, dated May 2, 1901.

(Folio 283). Statement showing the payments made under the direction of the City Comptroller for interest due on the Corporate Stock issued by the City of New York for the construction of the Rapid Transit Railroad, and a Summary of Construction Fund Disbursements.

(Folios 284 and 285). Statements showing the Yearly Balances of the General Fund and the Construction Fund.

(Folios 286 and 287). Recapitulation.

Respectfully submitted,

H. A. D. HOLLMANN,

*Auditor.*

## GENERAL FUND. REQUISITIONS.

Statement of requisitions made upon the Board of Estimate and Apportionment, for the authorization for the issue of Revenue Bonds, for the requirements of the Board of Rapid Transit Railroad Commissioners, from June 18, 1894, to December 31, 1901.

June 29, 1894.	As stated on page	8	of the Minutes of the Rapid Transit Commission.	\$	5,000.00
Jan. 8, 1895.	"	93	"	"	21,792.42
Apr. 11, "	"	183	"	"	5,000.00
May 7, "	"	236	"	"	17,751.19
Sept. 24, "	"	297	"	"	14,772.52
Dec. 17, "	"	324	"	"	30,118.62
June 18, 1896.	"	389	"	"	40,799.00
"	"	390	"	"	9,602.50
Nov. 19, "	"	434	"	"	16,545.83
Feb. 18, 1897.	"	484	"	"	16,950.04
May 20, "	"	517	"	"	18,734.87
July 29, "	"	528	"	"	13,578.55
Nov. 18, "	"	538	"	"	45,218.75
April 7, 1898.	"	643	"	"	34,115.21
Dec. 22, "	"	759	"	"	8,828.16
April 6, 1899.	"	802	"	"	10,610.00
" 13, "	"	806	"	"	1,806.70
July 13, "	"	827	"	"	6,113.33
Nov. 2, "	"	851	"	"	9,095.30
Feb. 7, 1900.	"	885	"	"	61,319.90
Mar. 29, "	"	920	"	"	55,500.00
July 12, "	"	990	"	"	129,673.38
Jan. 10, 1901.	"	1115	"	"	379,500.00
Mar. 28, "	"	1159	"	"	30,000.00
April 4, "	"	1178	"	"	8,121.60
May 2, "	"	1198	"	"	500.00
" 23, "	"	1208	"	"	5,000.00
Sept. 9, "	"	1263	"	"	400.00
					\$996,348.47

The Board of Rapid Transit Railroad Commissioners under date of September 24, 1895, made requisition upon the Board of Estimate and Apportionment, for the issue of Revenue Bonds to the amount of \$14,772.52 in addition to the unexpended balances of previous appropriations made on June 4, 1895, and on June 25, 1895; this unexpended balance to be rendered applicable with the amount of the said requisition, for the payment of expenses of the Commission, (as stated on page 297 of the minutes of 1895 of the Rapid Transit Board). Of this amount, \$2,979.98 of the said unexpended balance was duly reappropriated on October 24, 1895, (as stated on page 504 of the minutes of 1895, of the Board of Estimate), and on November 19, 1895, the issue of Revenue Bonds to the amount of \$9,252.27, (as stated on page 805 of the minutes of 1895, of the Board of Estimate), and on January 10, 1896, to the amount of \$7,336.56, (as stated on page 18 of the minutes of 1896 of the Board of Estimate), were authorized by the said Board of Estimate, making a total issue of Revenue Bonds amounting to \$16,588.83 for the purposes of the Rapid Transit Board; or the sum of \$1,816.31 in excess of the amount of the original requisition.....

\$1,816.31

*Amount carried forward* \$998,164.78

## REQUISITIONS—Continued.

Amount brought forward \$998,164.78

The said Board of Rapid Transit Railroad Commissioners under date of November 18, 1897, made requisition upon the Board of Estimate and Apportionment for the issue of Revenue Bonds to the amount of \$45,218.75 for the payment of expenses of the Commission, (as stated on page 538 of the minutes of 1897, of the Rapid Transit Board). Of this amount \$14,478.62 was appropriated on November 22, 1897, \$10,961.64 on February 28, 1898, and \$5,345.45 on June 7, 1898, by the said Board of Estimate, making a total of \$30,785.71, and leaving a balance of \$14,433.04 of the original requisition unappropriated. It appearing that an appropriation of \$30,785.71 would suffice to satisfy the purposes of the said requisition, (as stated on page 689 of the minutes of 1898, of the Board of Estimate).....\$14,433.04

The said Rapid Transit Board under date of April 7, 1898, again made requisition upon the Board of Estimate and Apportionment for the issue of Revenue Bonds to the amount of \$34,115.21 for the payment of expenses of the Board, (as stated on page 643 of the minutes of 1898, of the Rapid Transit Board). Of this amount \$28,245.66 was appropriated on July 1, 1898, leaving a balance of \$5,869.55 of the original requisition unappropriated. It appearing that an appropriation of \$28,245.66 would suffice to satisfy the purposes of the said requisition, (as stated on page 779 of the minutes of 1898, of the Board of Estimate). \$5,869.55

\$20,302.59

Total amount of Requisitions made upon the Board of Estimate and Apportionment for the requirements of the Board of Rapid Transit Railroad Commissioners, from June 18, 1894, to December 31, 1901 .....	{ \$977,862.19
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### APPROPRIATIONS.

STATEMENT SHOWING THE APPROPRIATIONS MADE BY THE BOARD OF ESTIMATE AND APPOINTMENT, FOR THE PURPOSES OF THE BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS, FROM JUNE 18, 1894, TO JANUARY 14, 1902.

DATE.	ISSUE OF REVENUE BONDS.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901-02.	TOTAL.
June 20, 1894, as stated on page 279 of the minutes of the Board of Estimate.	3 Bonds redeemable 1895.	\$5,000 00								\$5,000 00
Feb. 5, 1895, as stated on page 30 of said minutes.	1896.		\$21,792 42							21,792 42
June 4, " " " " " "	" " " "		17,751 19							17,751 19
" 25, " " " " " "	" " " "		5,000 00							5,000 00
Oct. 24, " " " " " "	Re-appropriation. No Bonds issued.									
Nov. 19, " " " " " "	8% Bonds redeemable 1897		9,252 27							9,252 27
Jan. 10, 1896, " " " " " "	" " " "		\$1,296 56							7,956 56
Mar. 4, " " " " " "	" " " "		10,303 57							10,303 57
" 12, " " " " " "	" " " "		19,814 85							19,814 85
July 2, " " " " " "	" " " "		2,063 32							2,063 32
Sept. 28, " " " " " "	" " " "		38,736 28							38,736 28
Oct. 30, " " " " " "	" " " "		9,602 50							9,602 50
Dec. 10, " " " " " "	" " " "		14,378 32							14,378 32
Jan. 14, 1897, " " " " " "	1898.									2,397 51
Mar. 1, " " " " " "	" " " "		15,130 70							15,130 70
June 2, " " " " " "	" " " "		1,819 28							1,819 28
" 2, " " " " " "	" " " "		18,734 87							18,734 87
Aug. 17, " " " " " "	" " " "		13,578 55							13,578 55
Nov. 22, " " " " " "	" " " "		14,478 62							14,478 62
Feb. 28, 1898, " " " " " "	1899.									10,961 64
June 7, " " " " " "	" " " "		5,345 45							5,345 45
July 1, " " " " " "	" " " "		28,245 66							28,245 66
Dec. 28, " " " " " "	1900.		8,828 16							8,828 16
April 21, 1899, " " " " " "	" " " "									10,610 00
" 21, " " " " " "	" " " "									1,806 70
July 31, " " " " " "	" " " "									6,113 33
Nov. 10, " " " " " "	" " " "									9,055 30
Mar. 6, 1900, " " " " " "	1901.									\$61,219 90
April 3, " " " " " "	" " " "									55,500 00
Aug. 8, " " " " " "	" " " "									129,673 38
Jan. 30, 1901, " " " " " "	1902.									\$375,000 00
Mar. 29, " " " " " "	" " " "									30,000 00
April 25, " " " " " "	" " " "									8,121 60
May 17, " " " " " "	" " " "									500 00
" 21, " " " " " "	" " " "									5,000 00
Sept. 11, " " " " " "	" " " "									400 00
Jan. 14, 1902, " " " " " "	1903.									4,500 00
		\$5,000 00	\$33,795 88	\$102,135 60	\$60,009 20	\$33,280 91	\$27,025 33	\$246,363 28	\$423,521 60	

Total amount of Appropriations made by the Board of Estimate and Apportionment for the purposes of the Board of Rapid Transit Railroad Commissioners, from June 18, 1894, to January 14, 1902.....	\$977,862 19
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# GENERAL FUND

## DISBURSEMENTS.

Statement showing the amount of disbursements made under the direction of the Board of Rapid Transit Railroad Commissioners, from June 18, 1894, to December 31, 1901 :

### ADMINISTRATIVE AND GENERAL OFFICE.

	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	TOTAL.
Compensation of Commissioners, .. .. .			\$30,000.00				\$45,000.00	\$30,000.00	\$105,000.00
Salaries.....	\$1,746.36	\$3,219.96	2,446.64	\$2,951.63	\$1,970.00	\$2,178.31	5,759.09	6,618.26	26,890.25
Office and telephone rentals.....	781.33	2,242.40	2,740.00	2,031.92	2,050.46		2,000.63	1,833.31	13,679.45
Stationery, printing and supplies	335.30	481.32	385.70	212.16	500.69	123.65	758.18	497.15	3,294.15
Furniture .. .. .						222.08	237.53	27.25	486.86
Stenography and Typewriting....	32.95	87.20		18.75		9.40	6.75	31.80	186.85
Postage .. .. .						10.00	50.00		60.00
Sundry contingent expenses.....	33.16	17.61		15.00		283.50	54.75	16.09	420.71
	\$2,029.10								
		\$6,048.49							
			\$35,572.34						
				\$5,230.00					
					\$4,521.15				
						\$2,826.94			
							\$53,806.33		
								\$39,023.80	
Total Amount of Administrative and General Office Disbursements.....									\$150,018.27



## DISBURSEMENTS—Continued.

## ENGINEERING.

	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	TOTAL.
Salaries.....	\$646.41	\$19,406.78	\$15,937.96	\$19,749.99	\$16,638.50	\$2,500.00	\$130,094.22	\$297,432.08	\$502,408.74
Office and Telephone Rentals.....							9,972.21	9,135.77	13,107.98
Stationery, Printing and Supplies.....		1,296.89	.55	459.45	2.65	1,198.00	4,889.95	2,614.98	10,422.47
Furniture.....		29.19	88.39		46.00		5,888.01	3,782.72	9,834.22
Telegraph Service.....							23.70	86.41	110.11
Locomobile Service.....							1,005.48	483.44	1,488.92
Lighting.....							22.72	307.49	330.21
Janitor Services.....								218.66	218.66
Engineering Instruments and Supplies.....		103.26	475.00	317.55	240.48		10,312.44	7,353.78	18,802.51
Maps, Plans, Prints and Photo. Supplies.....	59.06	114.67	472.10	62.32	178.08		764.78	1,715.42	3,366.43
Disbursements. (Traveling Expenses).....	563.02	51.90	31.91	3.75	2.70		1,100.89	4,258.60	6,012.77
Architectural and Electrical Services.....					450.00			5,771.46	6,221.46
Stenography and Typewriting.....		55.00		4.25					59.25
Postage.....							89.93	418.61	508.54
Inspections, Tests and Analysis.....			22.50		100.00		410.50	2,008.97	2,541.97
Borings.....				797.20	170.40			11,779.65	12,747.25
Consulting Engineer's Services.....		5,225.00							5,225.00
Sundry Contingent Expenses.....	2.85	4.60	.50	1.35	101.50		472.60	890.20	1,473.66
	\$1,271.34	\$26,250.29	\$17,028.82	\$21,395.86	\$17,930.31	\$3,698.00	\$161,047.23	\$348,258.30	
Total Amount of Engineering Disbursements.....									\$596,880.15

## DISBURSEMENTS—Continued.

## LEGAL.

	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	SUMMARY.	TOTAL.
ADVERTISING.										
Proposals for printing the minutes of the Board.	\$28.30								\$28.30	
" Railroad Construction.....						\$3,819.60			3,819.60	
Address to the voters of New York.....							\$586.35		586.35	
The Appointment of Commissioners by the Appellate Division of the Supreme Court, to condemn easements in Broadway, between 123d and 135th Streets, Borough of Manhat- tan, N. Y.....								\$8,121.60	8,121.60	
Proposals for Wash Borings.....								8.50	8.50	
The appointment of Commissioners by the Appellate Division of the Supreme Court, to determine the advisability of constructing a railroad in the Borough of Brooklyn, N. Y.....								5,359.47	5,359.47	
Proposals for Diamond Drill Borings.....								8.80	8.80	
										\$17,932.62
COUNSEL.										
Fees.....	\$21,500.00	\$15,833.33	\$25,833.32	\$12,500.00	15,000.00	25,000.00	21,250.00	136,916.65		
Stenography and Typewriting.....	281.95	1,155.17	251.77	1,003.24	121.33	449.63	335.36	3,598.45		
Printing.....	1,522.54	589.80	1,801.82	491.87	38.75	1,174.15	948.25	6,567.18		
Traveling and other expenses.....	521.03	229.78	446.33	168.03	71.62	146.06	128.38	1,711.25		
Searches and Consents.....	426.75	350.00	1,630.67				2,257.36	4,664.78		
Advertising.....		3,696.95	2,815.05	1,270.50				7,782.50		
										161,246.81
REAL ESTATE APPRAISAL.										
Fees for services of Appraisal of various prop- erties.....						1,500.00		400.00	1,900.00	
										1,900.00
SPECIAL COMMISSIONS.										
Compensation for Commissioners appointed by the Appellate Division of the Supreme Court, to determine the advisability of constructing the Railroad in the Borough of Manhattan, N. Y.....			6,000.00		6,000.00				12,000.00	
										12,000.00
Amounts carried forward.....	\$28.30	\$24,252.29	\$27,855.03	\$32,778.96	\$21,433.64	\$20,551.30	\$27,356.19	\$38,817.72		\$193,073.43

# LEGAL—Continued.

	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	SUMMARY.	TOTAL.
<i>Amounts brought forward</i> .....	\$28.30	\$24,252.29	\$27,855.03	\$32,778.96	\$21,433.64	\$20,551.30	\$27,356.19	\$38,817.72		\$193,073.43
CONSULTING ENGINEERS AND EXPERTS.										
Fees and expenses of consulting Engineers and Experts in the matter of testimony before the Special Commissioners.....			3,602.50		2,606.73				6,209.23	6,209.23
STENOGRAPHY AND TYPEWRITING.										
Services rendered to Special and Appraisal Commissions.....				6,146.77	4,046.51		1,596.35		11,789.63	11,789.63
DISBURSEMENTS.										
Printing.....					1,042.25				1,042.25	
Compensation for Consent Commissioners.....		\$1,435.84							1,435.84	
Notary fees in the matter of Consents.....								63.00	63.00	
Services of Clerk to Special Commission.....					300.00				300.00	
" " Appraisal ".....								900.00	900.00	
										3,741.09
	\$28.30	\$25,688.13	\$31,457.53	\$38,925.73	\$29,519.13	\$20,551.30	\$27,356.19	\$41,377.07		
Total amount of Legal Disbursements.....										\$214,903.38

## GENERAL FUND.

### SUMMARY OF DISBURSEMENTS.

Administrative and General Office.....	\$150,018.27
Engineering.....	306,880.15
Legal.....	214,903.38
Total Amount of General Fund Disbursements.....	\$661,801.80

## CONTRACT AND CONSTRUCTION.

Being a transcript of general information relative to the Contract and Construction.

## REQUISITION.

On March 1, 1900, a letter dated February 27, 1900, addressed to the Honorable Robert A. Van Wyck, Mayor, Etc., Chairman of the Board of Estimate and Apportionment of the City of New York, by the Honorable Alexander E. Orr, President of the Board of Rapid Transit Railroad Commissioners, and handing therewith a certified copy of a resolution of the said Board of Rapid Transit Railroad Commissioners adopted February 26, 1900, (as stated on page 910 of the minutes of 1900, of the Rapid Transit Board) making requisition upon the Board of Estimate and Apportionment for the sum of thirty-six million five hundred dollars, being the entire estimated cost for Construction and for Real Estate, for Terminals, Etc., of the proposed Rapid Transit Railroad, was presented by the Honorable Bird S. Coler, Comptroller, and pursuant to the same and the provisions of chapter 4 of the Laws of 1894, and the acts amendatory thereof, the said Board of Estimate and Apportionment at the stated meeting held on March 1, 1900, authorized the issue from time to time as may be required in the manner provided by law, Corporate Stock of the City of New York to an amount not exceeding the sum of \$36,500,000.00 to be applied to the purpose described in the said requisition of the Rapid Transit Board (as stated on page 160 of the minutes of 1900, of the Board of Estimate and Apportionment).

## CONTRACT.

Proposals received and opened at the meeting of the Board of Rapid Transit Railroad Commissioners, January 15, 1900, (as stated on page 862 of the minutes of 1900, of the Rapid Transit Board).

Contract awarded to John B. McDonald, Contractor, at the meeting of the Board of Rapid Transit Railroad Commissioners, January 16, 1900, (as stated on page 869 of the minutes of 1900, of the Rapid Transit Board).

CITY OF NEW YORK.

DEPARTMENT OF FINANCE.

*Contract No. 2124.*

Dated February 21, 1900.

Filed March 26, 1900.

Department of { The Board of Rapid Transit  
Railroad Commissioners  
of the City of New York.

Statement of Estimates and Account in the matter of the Contract for fully constructing and equipping the Rapid Transit Railroad, and to put the same in operation and thereafter to use, maintain and operate the same under a lease thereof from the City of New York for the term of fifty years.

JOHN B. McDONALD, *Contractor.*

Expiration of Contract for Sections I, II, III, IV. }  $4\frac{1}{2}$  years.

ESTIMATE.

Estimated cost for Construction, and for Real Estate, for Terminals, etc.

For Section I	\$15,000,000.00	
Terminals	1,000,000.00	
Real Estate	170,000.00	
		\$16,170,000.00
For Sections I and II	\$26,000,000.00	
Terminals	1,000,000.00	
Real Estate	370,000.00	
		\$27,370,000.00
For Sections I, II and III	\$32,000,000.00	
Terminals	1,000,000.00	
Real Estate	460,000.00	
		\$33,460,000.00
For Sections I, II, III and IV	\$35,000,000.00	
Terminals	1,000,000.00	
Real Estate	500,000.00	
		\$36,500,000.00

EXTRA WORK.

A resolution adopted by the Board of Rapid Transit Railroad Commissioners at a meeting of the said Board on May 2, 1901, providing for the construction of a third track on the portion of the route extending along the Boulevard (now Broadway) from 103rd to 137th Streets, that the work of such construction be done and paid for as Extra Work under contract for the construction and operation of the Rapid Transit Railroad dated February 21, 1900 (as stated on page 1193 of the minutes of 1901, of the said Rapid Transit Board).

## SECURITY.

Amount in Cash. For Construction pursuant to the Contract, deposited with the City Chamberlain February 24, 1900.....	\$1,000,000.00
Bond for Construction and Equipment, deposited with the City Comptroller at the time of execution of the Contract	5,000,000.00
Bond (continuing) for Rental and also for Construction, deposited with the City Comptroller at the time of execution of the Contract.....	1,000,000.00
Securities deposited with the City Comptroller at the time of execution of the Contract. Additional security for the performance of the provisions of the Bond for Rental and Construction...	1,000,000.00
Securities deposited with the City Comptroller, January, 1901. Security for Construction and Equipment.....	1,000,000.00

## SURETIES.

Names of the sureties for the \$5,000,000.00 Construction and Equipment Bond.

\$4,000,000.00	\$250,000.00
The Rapid Transit Subway Construction Company of New York.	The United States Fidelity & Guaranty Company of Maryland.
\$250,000.00	
The City Trust, Safe Deposit and Surety Company of Philadelphia, Pa.	

\$250,000.00	\$250,000.00
The American Surety Company of New York.	The National Surety Company of New York.

Name of the surety for the \$1,000,000.00 Continuing Bond for Rental and also for Construction.

Perry Belmont,  
New York.

## SECURITIES.

Statement of Securities deposited with *The Comptroller of the City of New York* by the *Rapid Transit Subway Construction Company* as additional security for the performance of the provisions of the Bond for Rental and Construction.

BONDS AND STOCK REGISTERED IN THE NAME OF "THE COMPTROLLER OF THE CITY OF NEW YORK, IN TRUST AS SECURITY FOR JOHN B. McDONALD, RAPID TRANSIT RAILROAD CONSTRUCTOR."

\$270,000 3% Illinois Central Railroad Company, St. Louis Division and Terminal First Mortgage Gold Bonds, (Nos. 80 to 99, inclusive, 1510 to 1596, inclusive, 2646, 2652 to 2657, inclusive, 3486 to 3536, inclusive, 3587 to 3618, inclusive, 3626 to 3681, inclusive, 4155, and 4318 to 4333, inclusive, for \$1,000 each).

Principal payable July 1st, 1951.

Interest payable January 1st and July 1st.

100,000 3% School House Bonds of the City of New York.

Principal payable November 1st, 1908.

Interest payable May 1st and November 1st.

100,000 3% Dock Bonds of the City of New York.

Principal payable November 1st, 1914.

Interest payable May 1st and November 1st.

200,000 3% Dock Bonds of the City of New York.

Principal payable November 1st, 1924.

Interest payable May 1st and November 1st.

100,000 3% Additional Water Stock of the City of New York.

Principal payable October 1st, 1907.

Interest payable April 1st and October 1st.

250,000 3½% Corporate Stock of the City of New York for the new Aqueduct.

Principal payable October 1st, 1919.

Interest payable April 1st and October 1st.

\$1,020,000

## SECURITIES.

Statement of Securities deposited with *The Comptroller of the City of New York* by the *Rapid Transit Subway Construction Company*, as security for Construction and Equipment.

BONDS AND STOCK REGISTERED IN THE NAME OF "THE COMPTROLLER OF THE CITY OF NEW YORK, IN TRUST AS SECURITY FOR JOHN B. McDONALD, RAPID TRANSIT RAILROAD CONSTRUCTOR."

\$30,000	3%	Additional Water Stock of the City of New York. Principal payable October 1st, 1905. Interest payable April 1st and October 1st.
20,000	3%	Consolidated Stock of the City of New York, for acquiring lands for Mulberry Bend Park. Principal payable November 1st, 1924. Interest payable May 1st and November 1st.
50,000	3%	Dock Bonds of the City of New York. Principal payable November 1st, 1925. Interest payable May 1st and November 1st.
15,000	3½%	Consolidated Stock of the City of New York for the new East River Bridge. Principal payable November 1st, 1918. Interest payable May 1st and November 1st.
30,000	3½%	Corporate Stock of the City of New York for the New Aqueduct. Principal payable October 1st, 1919. Interest payable April 1st and October 1st.
25,000	3½%	Corporate Stock of the City of New York, for School Houses and Sites therefor in the Boroughs of Manhattan and The Bronx. Principal payable November 1st, 1940. Interest payable May 1st and November 1st.
100,000	3½%	Corporate Stock of the City of New York, for the Uses and Purposes of the Department of Docks and Ferries. Principal payable November 1st, 1928. Interest payable May 1st and November 1st.
\$270,000		<i>Amount carried forward.</i>



\$270,000 *Amount brought forward.*

237,000 3½% Corporate Stock of the City of New York, for the Construction of the Rapid Transit Railroad.  
Principal payable November 1st, 1950.  
Interest payable May 1st and November 1st.

COUPON BONDS.

250,000 3% Chicago & Alton Railroad Company Refunding 50 years Gold Bonds (Nos. 15115 to 15364, inclusive, for \$1,000 each).

Principal payable October 1st, 1949.

Interest payable April 1st, and October 1st.

251,000 3% Illinois Central Railroad Company, Litchfield Division, First Mortgage Gold Bonds, (Nos. 751 to 1000 inclusive, and 1500, for \$1,000 each).

Principal payable January 1st, 1951.

Interest payable January 1st and July 1st.

\$1,008,000

CITY LIEN ON EQUIPMENT.

The City shall also have a first lien upon the Equipment of the Railroad, as further security for the faithful performance by the Contractor of the covenants, conditions and agreements of the contract of February 21, 1900. Such lien shall arise immediately upon the acquisition by the Contractor of any part of the Equipment for use on or in connection with the said Railroad or any part of it, or intended for such use, whether or not such equipment be set up or delivered upon or at the railway.

# BONDS ON CONTRACTS FOR CONSTRUCTION.

Naming Sub-Contractor, Sub-Section Limits, Surety and Amount of Bonds assigned to the City of New York by John B. McDonald, Contractor, (as stated on page 1,269 of the minutes of 1901 of the Rapid Transit Board).

Section No.	SUB-SECTION LIMITS.	NAME OF SUB-CONTRACTOR.	SURETY.	AMOUNT OF BONDS.
1.	Post Office Loop to centre Chambers Street.....	Degnon-McLean Contracting Co....	{ Myron T. Herrick, W. P. Johnson, Charles A. Otis, Jr., M. J. Degnon and Colin McLean.....	\$200,000.00
2.	Centre Chambers Street to centre Great Jones Street.....	Degnon-McLean Contracting Co....	United States Fidelity and Guaranty Company.....	300,000.00
3.	Centre Great Jones Street to centre 33d Street, plus 100 feet.....	Holbrook, Calot & Daly Contracting Co.....	James W. Daly and Jonathan Dwight.....	500,000.00
4.	Centre 33d Street, plus 100 feet, to centre 41st Street.....	Ira A. Shaler.....	Ira A. Shaler, John D. MacLennan and William L. Harkness.....	150,000.00
5-A.	Centre 41st Street, Park Avenue to 42d Street to Broadway, to centre 47th Street.....	Degnon-McLean Contracting Co....	{ Myron T. Herrick, W. P. Johnson, Charles A. Otis, Jr., M. J. Degnon and Colin McLean.....	200,000.00
5-B.	Centre 47th Street to centre 60th Street.....	Naughton & Co.....	United States Fidelity and Guaranty Company.....	100,000.00
6-A.	Centre 60th Street to centre 82d Street.....	William Bradley.....	William Bradley, James Bradley and G. W. Plunkitt.....	300,000.00
6-B.	Centre 82d Street to centre 104th Street.....			
7.	Portal of tunnel at 103d Street to centre 110th Street (Lenox Ave.).....	Farrell & Hopper.....	{ United States Fidelity and Guaranty Company and the Fidelity and Deposit Company of Maryland.....	300,000.00
8.	Centre 110th Street to centre 135th Street, plus 100 feet.....			
9-A.	From point north of centre of 135th Street and Lenox Avenue to East Building Line of Gerard Avenue on East 149th Street.....	McMullen & McBean.....	Fidelity and Deposit Company of Maryland.....	200,000.00
9-B.	From East Building Line of Gerard Avenue on 149th Street to point beyond Third Avenue, where steel Viaduct begins.....	J. C. Rodgers.....	Fidelity and Deposit Company of Maryland.....	100,000.00
10.	East side Viaduct from west side Brook Avenue (Building Line) to Bronx Park and 182d Street..	Terry & Tonch Construction Co. (Also for Sections 12 and 15).....	Work not begun.....	
	East side Viaduct from west side Brook Avenue (Building Line) to Bronx Park and 182d Street.....	E. P. Roberts (for Viaduct Foundations).....	Fidelity and Deposit Company of Maryland.....	10,000.00
11.	Centre 104th Street to south side of 125th Street plus 10 feet on Broadway.....	John Shields.....	Fidelity and Deposit Company of Maryland.....	175,000.00
Amount carried forward.....				\$2,535,000.00

# BONDS ON CONTRACTS FOR CONSTRUCTION—Continued.

Section No.	SUB-SECTION LIMITS.	NAME OF SUB-CONTRACTOR.	SURETY.	AMOUNT OF BONDS.
12.	Manhattan Valley Viaduct south side (Building Line) 125th Street plus 10 feet to north side (Building Line) 133rd Street.....	Terry & Tench Construction Co. (also for sections 10 and 15).....	<i>Amount brought forward.....</i>	\$2,535,000.00
	Manhattan Valley Viaduct south side (Building Line) 125th Street plus 10 feet to north side (Building Line) 133rd Street.....	E. P. Roberts (for Viaduct Foundations and Stone Piers).....	(Work partly begun.) United States Fidelity and Guaranty Company.....	5,000.00
13.	North side 133rd Street to centre 182nd Street plus 100 feet.....		Fidelity and Deposit Company of Maryland.....	5,000.00
14.	Centre 182nd Street plus 100 feet to Hillside Avenue.....	L. B. McCabe & Brother.....	Fidelity and Deposit Company of Maryland.....	400,000.00
15.	West Side Viaduct, Hillside Avenue, to the Terminus near Bailey Avenue.....	Terry & Tench Construction Co. (also for sections 10 and 12).....	Work not begun.....	
	West Side Viaduct, Hillside Avenue, to the Terminus near Bailey Avenue.....	E. P. Roberts (for Viaduct Foundations).....	Fidelity and Deposit Company of Maryland.....	10,000.00
	Sewer work.....	James Pilkington.....	United States Fidelity and Guaranty Company, and the City Trust, Safe Deposit and Surety Company of Philadelphia, Pa.	28,500.00
	Sewer work.....	Cunningham & Kearns.....	United States Fidelity and Guaranty Company.....	10,750.00

# BONDS ON CONTRACTS FOR MATERIAL.

CONTRACT FOR.	NAME OF SUB-CONTRACTOR.	SURETY.	
Steel.....	American Bridge Company.....	Lawyers' Surety Company of New York.....	\$450,000.00
Cast Iron.....	John Fox & Co.....		
Cement.....	United Building Material Co.....	The National Surety Company, The United States Fidelity and Guaranty Company, and the City Trust, Safe Deposit and Surety Company of Philadelphia, Pa.....	200,000.00
Asphalt, Water-proofing and Felt.....	Sicilian Asphalt Paving Co.....	Howard Carroll and Charles C. Clausen.....	125,000.00
Total amount of Sub-Contractor's Bonds assigned to the City.....			\$3,769,250.00

# CONSTRUCTION FUND.

## CORPORATE STOCK.

Statement showing the issue of Corporate Stock of the City of New York, from June 25, 1900, to December 31, 1901, the proceeds thereof to be applied to the construction of the Rapid Transit Railroad:

No.	Date of Sale.		Date of Issue.		Maturity.	Interest Rate.	Rate of Premium.	Amount Issued.	Amount of Premium.	Amount of Proceeds Credited.
1	1900 June	25	1900 June	25	November 1, 1929	3½%	10 54¢	\$1,000,000 00	\$103,400 00	\$1,103,400 00
2	January	30	February	4	" " 1950	3%	1.468064%	1,500,000 00	22,020 96	1,522,020 96
3	March	25	March	27	" " "	3½%	10 51¢	2,500,000 00	202,750 00	2,702,750 00
4	June	17	June	18	" " 1948	"	6.5777%	1,500,000 00	98,603 50	1,598,603 50
5	September	16	September	18	" " 1949	"	3.155%	3,000,000 00	94,650 00	3,094,650 00
6	December	12	December	18	" " 1948	"	6.291%	2,500,000 00	157,375 00	2,657,375 00
Total amount of Corporate Stock Issued.....								\$12,000,000 00		
Total amount of Premium on the Issue of Corporate Stock.....									\$740,761 46	

Total amount of Proceeds applicable to the construction of the  
Rapid Transit Railroad from June 25, 1900, to December 31, 1901.. } \$ 12,740,761 46

# CONSTRUCTION FUND.

## DISBURSEMENTS.

Statement showing the requisitions made upon the Board of Rapid Transit Railroad Commissioners, and the payments made under the direction of the said Rapid Transit Board to *John B. McDonald, Contractor*, for work done and materials furnished under contract dated February 21, 1900, for the construction and operation of the Rapid Transit Railroad of the City of New York from February 21, 1900, to December 31, 1901.

REQUISITION.	TO DATE.		PAYMENTS AUTHORIZED.		TO WHOM.		1900.	1901.	TOTAL.
1.....	1900 To August	31	1900 September 27	As stated on page 1009 of the minutes of the Rapid Transit Commission ...	John B. McDonald, Contractor		\$265,000.00		
2.....	September 30		October 18	As stated on page 1034 of said minutes	"		187,000.00		
3.....	October 31		November 15	" " " 1073	"		346,000.00		
4.....	November 30		December 30	" " " 1097	"		359,000.00		
5.....	December 31		1901 January 24	" " " 1121	"		528,000.00		\$1,685,000.00
6.....	January 31		February 14	" " " 1134	"			\$564,000.00	
7.....	February 28		March 14	" " " 1151	"			572,000.00	
8.....	March 31		April 11	" " " 1180	"			773,000.00	
9.....	April 30		May 9	" " " 1201	"			977,000.00	
10.....	May 31		June 13	" " " 1211	"			865,000.00	
11.....	June 30		July 10	" " " 1229	"			863,000.00	
12.....	July 31		August 13	" " " 1259	"			806,000.00	
13.....	August 31		September 9	" " " 1267	"			871,000.00	
14.....	September 30		October 15	" " " 1293	"			856,000.00	
15.....	October 31		November 14	" " " 1307	"			1,249,000.00	
16.....	November 30		December 13	" " " 1321	"			1,055,000.00	
17.....	December 31		1902 January 16	" " " 1357	"			958,000.00	10,343,000.00

Total amount paid to *John B. McDonald, Contractor*, for work done and materials furnished under contract dated February 21, 1900, from February 21, 1900, to December 31, 1901..... \$12,028,000.00

## DISBURSEMENTS—Continued.

## EXTRA WORK.

Statement showing the requisitions made upon the Board of Rapid Transit Railroad Commissioners, and the payments made under the direction of the said Rapid Transit Board to *John B. McDonald, Contractor*, for extra work done and materials furnished under contract dated February 21, 1900, for the construction and operation of the Rapid Transit Railroad of the City of New York, from May 2, 1901, to December 31, 1901, in accordance with the resolution of the Board adopted May 2, 1901, providing for the construction of a third track on the portion of the route extending along the Boulevard (now Broadway), from 103d to 137th Streets, in accordance with an agreement between the Contractor and the City, and the sureties to the said contract of the 21st February, 1900, dated 2d May, 1901.

REQUISITION.	TO DATE.	PAYMENTS AUTHORIZED.	TO WHOM.	1901.	TOTAL.
		1901			
1.	Sept. 30, 1901.	Oct. 15. As stated on page 1294 of the minutes of the Rapid Transit Commission.....	John B. McDonald, Contractor.	848,000.00	
2.	Oct. 31. "	Nov. 14. As stated on page 1308 of said minutes	John B. McDonald, Contractor.	35,000.00	
3.	Nov. 30. "	Dec. 13. As stated on page 1322 of said minutes	John B. McDonald, Contractor.	46,000.00	
4.	Dec. 31. "	1902 Jan. 16. As stated on page 1358 of said minutes	John B. McDonald, Contractor.	33,000.00	\$162,000.00

Total amount paid to <i>John B. McDonald, Contractor</i> , for extra work done and materials furnished under contract dated February 21, 1900, in accordance with the resolution of the Rapid Transit Board adopted 2d May, 1901, from May 2, 1901, to December 31, 1901.....	} \$162,000.00
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DISBURSEMENTS—*Continued.*

## INTEREST ON CORPORATE STOCK.

Statement showing the payments made under the direction of the City Comptroller, for interest due on the Corporate Stock issued by the City of New York, for the construction of the Rapid Transit Railroad.

No.	FOR WHAT.	DUE.	1900.	1901.	TOTAL.
1.	The payment of interest due on the Corporate Stock issued by the City of New York, for the construction of the Rapid Transit R.R...	Nov. 1, 1900	\$12,250.00	.....	\$12,250.00
2.	The payment of interest due on the Corporate Stock issued by the City of New York, for the construction of the Rapid Transit R.R...	May 1, 1901	.....	\$36,638.88	
3.	The payment of interest due on the Corporate Stock issued by the City of New York, for the construction of the Rapid Transit R.R...	Nov. 1, 1901	.....	116,125.02	\$152,763.90

Total amount in Interest paid on the Corporate Stock issued by the City of New York for the construction of the Rapid Transit Railroad from June 25, 1900, to December 31, 1901.....	}	\$165,013.90
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## CONSTRUCTION FUND.

## SUMMARY OF DISBURSEMENTS.

For work done and materials furnished pursuant to contract dated February 21, 1900.....	\$12,028,000.00
For extra work done and materials furnished pursuant to agreement dated May 2, 1901.....	162,000.00
For interest due on Corporate Stock issued by the City of New York for the construction of the Rapid Transit Railroad..	165,013.90
Total amount of Construction Fund Disbursements.....	\$12,355,013.90

# GENERAL FUND.

## BALANCES.

STATEMENT SHOWING THE YEARLY BALANCES OF THE GENERAL FUND—1894-1901.

Year.	Appropriations.	Disbursements.	Total Disbursements.	Excess Disbursements, chargeable to unexpended balances of previous appropriations.	Surplus, applicable with the current appropriation.
1894	\$3,000.00	Administrative and General Office..... Engineering..... Legal .....	\$2,929.10 1,271.34 28.30		
1895	53,795.88	Administrative and General Office..... Engineering..... Legal .....	\$6,048.49 26,250.29 25,688.13	\$4,228.74	\$771.26
1896	102,135.60	Administrative and General Office..... Engineering..... Legal .....	\$35,572.34 17,028.82 31,457.53	57,986.91	
1897	66,009.59	Administrative and General Office..... Engineering..... Legal .....	\$5,230.06 21,395.86 38,925.73	84,058.69	18,076.91
1898	53,380.91	Administrative and General Office..... Engineering..... Legal .....	\$4,521.15 17,930.31 29,519.13	65,551.65	457.94
1899	27,625.33	Administrative and General Office..... Engineering..... Legal .....	\$2,826.94 3,698.06 20,551.30	51,970.59	1,410.32
1900	246,393.28	Administrative and General Office..... Engineering..... Legal .....	\$53,866.33 161,047.23 27,356.19	27,076.24	549.09
	\$554,340.59		242,269.75		4,123.53
		<i>Amounts carried forward</i>	\$533,142.57	\$4,191.03	\$5,389.05



# BALANCES—Continued.

Year.	Appropriations.	Disbursements.	Total Disbursements.	Excess Disbursements, chargeable to unexpended balances of previous appropriations.	Surplus, applicable with the current appropriation.
1901	\$554,340.59 423,521.60	<i>Amounts brought forward</i> ..... Administrative and General Office..... \$39,073.86 Engineering..... 348,258.30 Legal..... 41,377.07	\$533,142.57  428,659.23	\$4,191.03  5,137.63	\$25,389.05  .....
Totals.	\$977,862.19	Unexpended Balance of the General Fund to December 31, 1901.....	\$961,801.80 16,060.39	\$9,328.66 16,060.39	\$25,389.05 .....
	\$977,862.19		\$977,862.19	\$25,389.05	\$25,389.05

\*Disbursements chargeable to the appropriation of \$7,336.56 made by the Board of Estimate on January 10, 1895, pursuant to the requisition of September 24, 1895.

# CONSTRUCTION FUND.

## BALANCES.

STATEMENT SHOWING THE YEARLY BALANCES OF THE CONSTRUCTION FUND—1900-1901.

Year.	Amount of proceeds of corporate stock issued.	Disbursements.	Total Disbursements.	Excess Disbursements, chargeable to the current stock issue.	Surplus, applicable with the proceeds of the current stock issue.
1900	\$1,165,400.00	For Work and Materials.....	\$1,685,000.00	*\$579,600.00	.....
1901	11,635,361.46	For Work and Materials.....\$10,343,000.00 For Extra Work and Materials..... 162,000.00 For Interest on the Corporate Stock.. 165,013.90	 10,670,013.90	 .....	 \$965,347.56
Totals.	\$12,740,761.46	Unexpended Balance of the Construction Fund to December 31, 1901.....	\$12,355,013.90 385,747.56	\$579,600.00 385,747.56	\$965,347.56 .....
	\$12,740,761.46		\$12,740,761.46	\$965,347.56	\$965,347.56

\*Disbursements chargeable to the proceeds of the issue of Corporate Stock of February 4, 1901.

## RECAPITULATION.

### BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS.

#### GENERAL FUND.

##### REQUISITIONS.

Total amount of Requisitions made upon the Board of Estimate and Apportionment for the requirements of the Board of Rapid Transit Railroad Commissioners from June 18, 1894, to December 31, 1901 .....	\$977,862.19
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##### APPROPRIATIONS.

Total amount of Appropriations made by the Board of Estimate and Apportionment for the purposes of the Board of Rapid Transit Railroad Commissioners, from June 18, 1894, to January 14, 1902 .....	\$977,862.19
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##### DISBURSEMENTS.

Total amount of Administrative and General Office Disbursements .....	\$150,018.27
Total amount of Engineering Disbursements .....	596,880.15
Total amount of Legal Disbursements .....	214,903.28
Total amount of General Fund Disbursements .....	961,801.80

##### UNEXPENDED BALANCE.

Unexpended Balance of the General Fund to December 31, 1901 .....	\$16,060.39
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#### CONSTRUCTION FUND.

##### CORPORATE STOCK.

Total issue of Corporate Stock of the City of New York from June 25, 1900, to December 31, 1901 .....	\$12,000,000.00
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##### PREMIUM.

Total amount of Premium on the issues of Corporate Stock .....	740,761.46
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##### PROCEEDS.

Total amount of Proceeds applicable to the construction of the Rapid Transit Railroad from June 25, 1900, to December 31, 1901 .....	12,740,761.46
<i>Amount carried forward.</i> .....	\$12,740,761.46

CONSTRUCTION FUND—*Continued.*

## DISBURSEMENTS.

<i>Amount brought forward</i> .....	\$12,740,761.46
For Work done and Materials furnished pursuant to Contract dated February 21, 1900.....	\$12,028,000.00
For Extra Work done and Materials furnished pursuant to agreement dated May 2, 1901..	162,000.00
For Interest due on the Corporate Stock issued by the City of New York for the construction of the Rapid Transit Railroad.....	165,013.90
Total amount of Construction Fund Disbursements.....	12,355,013.90

## UNEXPENDED BALANCE.

Unexpended Balance of the Construction Fund to December 31, 1901.....	\$385,747.56
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## CASH.

Statement of Cash transmitted by Bion L. Burrows, Secretary of the Board of Rapid Transit Railroad Commissioners, through Bird S. Coler, Comptroller, to Patrick Keenan, Chamberlain of the City of New York, account General Fund of the said City:

October 8, 1900. Proceeds for the sales of plans, etc. (as stated on page 1036 of the minutes of 1900, of the Board of Rapid Transit Railroad Commissioners).....	\$169.35
August 20, 1901. Proceeds for the sales of plans, etc. (as stated on page 1271 of the minutes of 1901, of the said Board).....	90.85
Total amount transmitted to the City Chamberlain.....	\$260.20

## SUMMARY OF DISBURSEMENTS.

Total amount of General Fund Disbursements.....	961,801.80
Total amount of Construction Fund Disbursements .....	12,190,000.00
Total amount of Interest paid on Corporate Stock.....	165,013.90
Total amount disbursed in the Construction and Equipment of the Rapid Transit Railroad from June 18, 1894, to December 31, 1901 .....	\$13,316,815.70

## FINALE.



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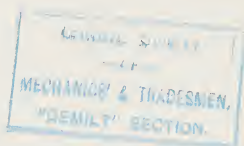
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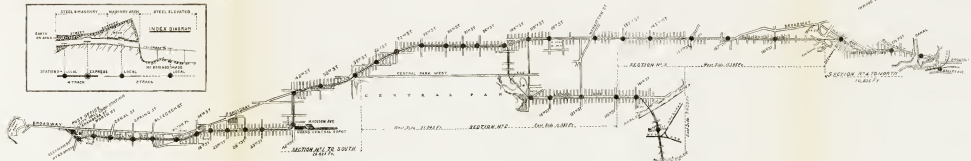
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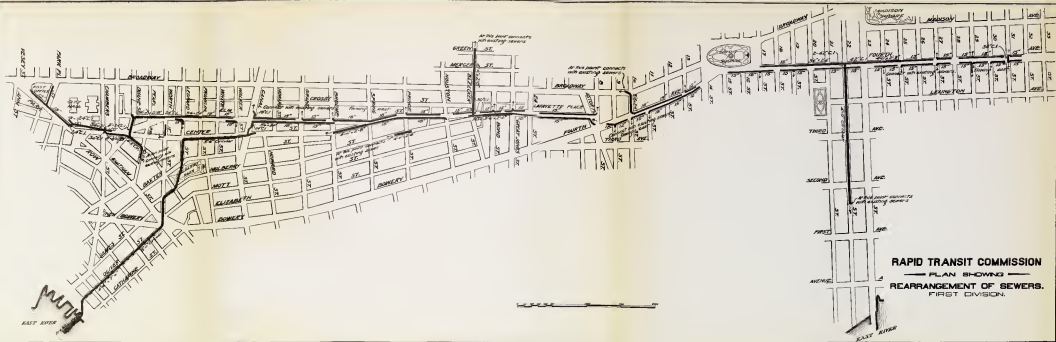
**RAPID TRANSIT COMMISSION**  
**MAP AND PROFILE**  
**OF**  
**RAILWAY**  
 SHOWN BY CONTRACT DRAWINGS  
 DATED APRIL 7<sup>th</sup> 1898



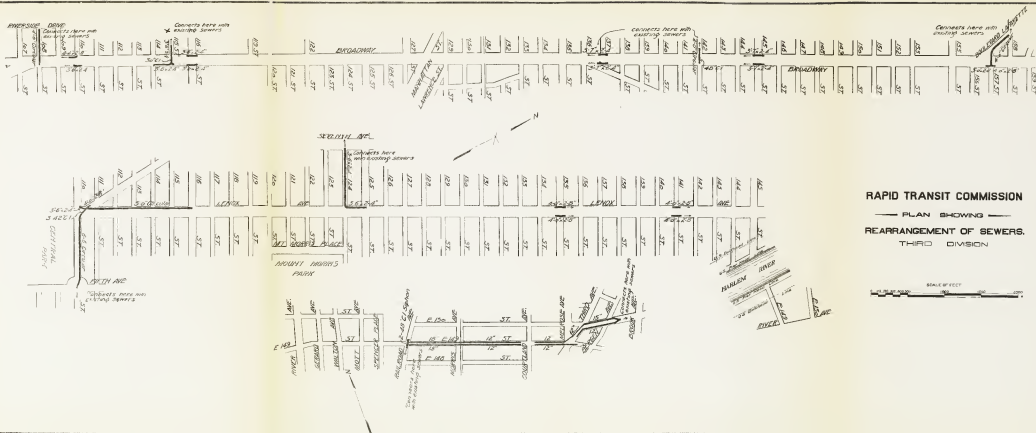
*John B. P. ... Chief Engineer*





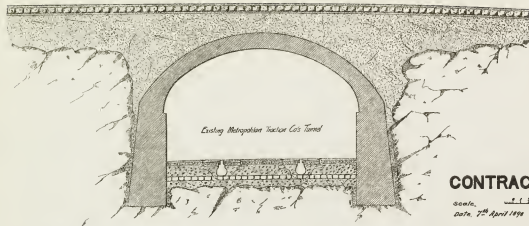










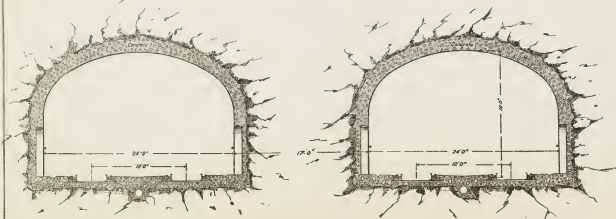


# CONTRACT DRAWING N° C 9

Scale.

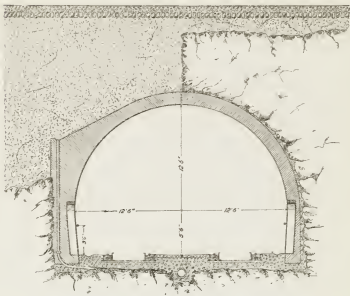
Date, 7<sup>th</sup> April 1898

*Wm. Barclay Harrison*  
Chief Engineer



Park Ave Tunnel from 33<sup>rd</sup> to 41<sup>st</sup> St.






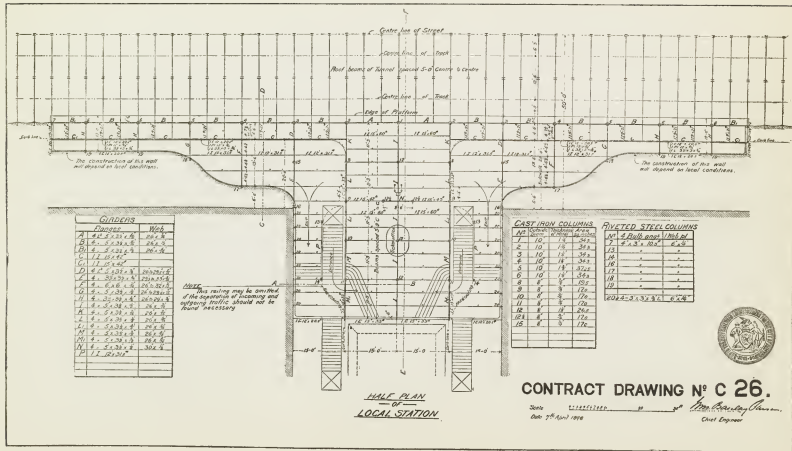
Section of Deep Tunnel under 104<sup>th</sup> St.



# CONTRACT DRAWING N<sup>o</sup> C 9

Scale,   
 Date, 7<sup>th</sup> April 1898

*Wm. Barclay Parsons*  
 Chief Engineer



GIRDERS		
Flange	Web	
A 4" x 5.25 x 5	26 x 3	
B 6" x 5.25 x 5	26 x 3	
C 4" x 5.25 x 5	26 x 3	
D 12" x 12" x 12		
E 4" x 5.25 x 5	26 x 3	
F 4" x 5.25 x 5	26 x 3	
G 4" x 5.25 x 5	26 x 3	
H 4" x 5.25 x 5	26 x 3	
I 4" x 5.25 x 5	26 x 3	
J 4" x 5.25 x 5	26 x 3	
K 4" x 5.25 x 5	26 x 3	
L 4" x 5.25 x 5	26 x 3	
M 4" x 5.25 x 5	26 x 3	
N 4" x 5.25 x 5	26 x 3	
P 12" x 12" x 12		

#### CAST IRON COLUMNS

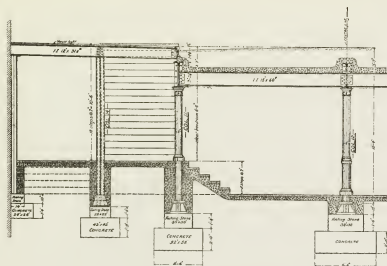
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2	10" x 10" x 10"	34.5	10.0
3	10" x 10" x 10"	34.5	10.0
4	10" x 10" x 10"	34.5	10.0
5	10" x 10" x 10"	34.5	10.0
6	10" x 10" x 10"	34.5	10.0
7	10" x 10" x 10"	34.5	10.0
8	10" x 10" x 10"	34.5	10.0
9	10" x 10" x 10"	34.5	10.0
10	10" x 10" x 10"	34.5	10.0
11	10" x 10" x 10"	34.5	10.0
12	10" x 10" x 10"	34.5	10.0
13	10" x 10" x 10"	34.5	10.0
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15	10" x 10" x 10"	34.5	10.0

#### RIVETED STEEL COLUMNS

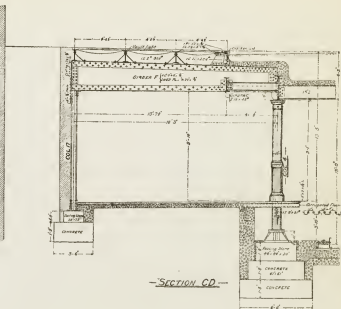
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7	10" x 10" x 10"	34.5	10.0
8	10" x 10" x 10"	34.5	10.0
9	10" x 10" x 10"	34.5	10.0
10	10" x 10" x 10"	34.5	10.0
11	10" x 10" x 10"	34.5	10.0
12	10" x 10" x 10"	34.5	10.0
13	10" x 10" x 10"	34.5	10.0
14	10" x 10" x 10"	34.5	10.0
15	10" x 10" x 10"	34.5	10.0



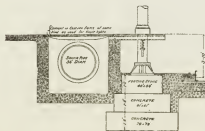




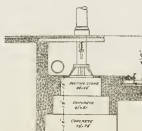
SECTION AB



SECTION CD



SECTION UNDER PLASTER  
AT 4" AVE. AND 20" STREET



SECTION SHOWING ARRANGEMENT OF JOINTS IN EXTERIOR  
JOINTS SHOULD NOT BE PLACED OVER PLASTER



**CONTRACT DRAWING No C 27.**

Scale 1" = 12'-0"  
Date 17 April 1918  
Chas. E. Brown  
Civil Engineer



Tom Barclay Carson  
CHIEF ENGINEER









